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July 31, 1920

Human Engineering Number

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Future Mineral Conquistadores
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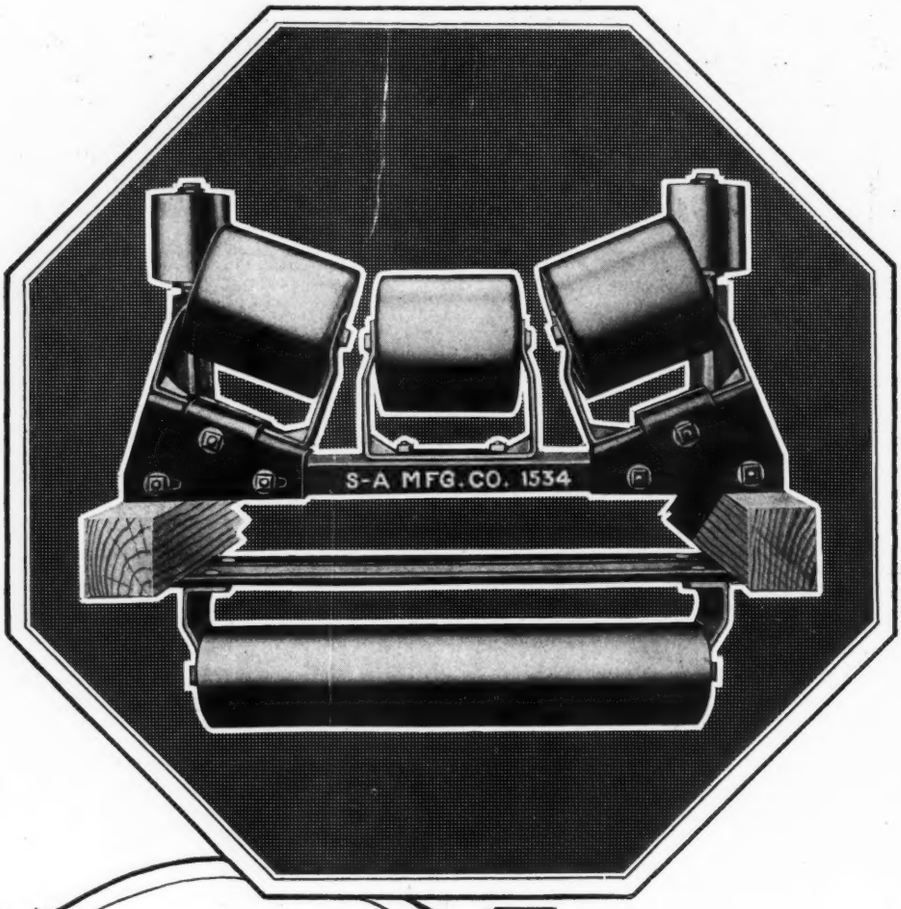

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Human Engineering in Mining

WE DO NOT KNOW who invented the term "Human Engineering," but it was a happy phrase, and has been used a good deal during the last year. It is, indeed, the same as welfare work, and all welfare work is human engineering, but the latter phrase puts the science on the square man-to-man basis where it really belongs.

It pays the employer to look after the working conditions of the employee; it pays the mining company to study and improve underground conditions. Bad ventilation, for example, is expensive: men often cannot work a full shift, and can do only half the usual work, if the air is bad. Properly heated and equipped changehouses and shower baths are as much the business of the good mine manager as taking care of his powder and other supplies.

Proceeding further, progressive companies find that it is not enough to take care of the miner or millman when he is working, if he is not well situated during the sixteen hours of the day that he is not on the job. He must live in sanitary conditions, have a contented mind, eat well and sleep well, and have healthful recreation; otherwise his wage is likely to turn out a poor investment to the company. Eternally unsatisfied and restless, he wanders from job to job, seeking contentment—a tramp miner.

It is, therefore, the soundest of business principles for employers to consider their employees' welfare, not only as regards wage but also as to the far more important living conditions for which the employee gives up his wage. Unless there are perquisites of good surroundings, the wage in itself is generally insufficient pay, no matter how high it runs in dollars. Miners on the Mother Lode in California usually work for a less wage than other precious-metal miners, because they can have a permanent pleasant home and garden, and education and social standing for their children; and miners on the desert and in the mountain tops must be paid higher, so that they can save and move on, if the homing instinct cannot be properly satisfied.

No corporation whose stock is held wisely has the right to do anything with its funds that is not strictly good business, and helping toward profits, unless (which is unlikely) by a special vote of the stockholders. A mine or a corporation is a business enterprise; the charity, if there is to be any, is the affair of the stockholders after dividends are disbursed. Therefore, miners owe no servile gratitude to mining companies for any and all money expended for their welfare: it is a business proposition, and no thanks are in order on either side; but each side (employee and employer) owes the other the respect of man for man—the respect that one square, able man, doing his share of the common job and a little more for good measure, owes the other. It makes toward a sound partnership, in which each side helps himself and the other.

Americans are by theory and by nature independent; and are apt to style extensive projects for the common welfare, in which the individual has small part, as paternalism, and therefore weakening. This is a false conception as applied to work like that which has been done by the Steel Corporation, the Homestake Mine, the Chile Copper Co., the Ajo company in Arizona, and the Wallaroo & Moonta in Australia—it is not paternalism, but robust common sense and healthy self-interest. And in no other way can these steps toward good living be accomplished than by large capital expended for the well-being of all.

In cities without water works and sewerage, the individual cannot help himself, no matter how able: the city treasury, or, as often, some adventuring outside corporation, must supply the funds to bring him the larger comforts and safeguards. In towns given up entirely to mining, such as those clustering around some of the colossal mines which the economic development of the times has brought into being, there is no force strong enough to put in public works but the mining companies themselves. Part of their job, and their responsibility—for the conservation of the humanity which has drifted under their strong influence is part of their duty to the commonwealth—is to do what should be done, in the way of houses, sanitation, streets, parks, schools, churches, education, and amusement. If they do not do it, nobody will; and both they and the employees will be so much the worse off.

True everywhere, this is especially true of countries less advanced than the United States, where American or British enterprises are pioneering. Their economic penetration can be made the most effective human uplift that can be devised. A recent writer advocated the United States sending an army of teachers into Mexico to solve the Mexican problem. It has been the special genius of American political administration of less fortunate countries to advance the native development and prosperity in a way that no other country has attained. American and British mining companies have not always done what they could or should do in this respect. It is true, for example, that they have not done much in Mexico; and they should look into this at once, and follow their own advanced example, as set forth in developments like those described in this issue. Nor have the great companies in the United States always accomplished enough in this regard. A mining engineer from Australia told us recently that he found conditions especially unsatisfactory in Bingham Canyon. We have not seen Bingham Canyon, and we cite this with hesitation. If we are wrong, we want to be corrected. But there are many properties that we have seen where improvement is in order.

The Reputation of the Colorado School of Mines

THE administration of the Colorado School of Mines, at Golden, has, it appears, been under investigation since November, 1918, by the American Association of University Professors, through the Committee of Academic Freedom; and after rigid investigation and deliberation that committee has made public its report. The committee's report is signed by M. J. Libby, chairman; Herbert S. Hadley, ex-Governor of Missouri; J. M. Coulter, H. O. Hofman, and A. A. Porter. Those who are not familiar with academic circles will at least recognize the name of ex-Governor Hadley, who was put forward as a Progressive candidate for president at the Republican Convention of 1912, and, who, if Roosevelt (as was hoped) had indorsed him instead of bolting the party, would doubtless have been elected President of the United States.

The report of the committee is as blunt and unvarnished as could be desired. There is, at least, no doubt as to the verdict. It is frankly condemnatory of the School of Mines administration, particularly of the president, Victor C. Alderson, and the controlling element of the board of trustees.

The committee charges that President Alderson lowered the standards of scholarship "by compelling members of the faculty to change grades of students, especially those with influential relatives," and that in this and other ways he "repeatedly violated the essential principles of sound educational administration and of professional ethics."

The principal charges on which the committee's investigation was undertaken were made by former professors of the school; and the committee now sustains their charges. Various former professors swore that "Alderson arbitrarily raised the grades of some men," and that he "dominated and coerced individual members of the faculty as a whole in the matter of grades." One professor testified that "President Alderson insisted on seeing all quiz papers before they were returned to the students, but after they were marked by instructors, and Alderson warned him to change a student's grade to a passing grade or he (the professor) would get into trouble." An alumnus of the school swore that "many students at the school during Alderson's administration were allowed to pass, after having failed in their studies, because they were either athletes or relatives of influential men of Colorado."

The first charge of the ex-professors of the School of Mines was that "trustees intervened in matters of school discipline," and in finding this true, the committee of the American Association of University Professors observes: "The trustees of the Colorado School of Mines do not seem to realize the impropriety and the evil influence of their interference in the routine affairs and educational problems of the institution."

The American Association of University Professors is a nation-wide institution, and, we believe, a final and trustworthy court in such matters.

Such a report, however, does not come as a surprise or a shock to us. We have to advise the excellent people of Colorado that the conduct of their School of Mines has for years been a by-word wherever it was discussed. It has been for years a matter of common talk and consent that in Colorado politics dominated the administration at Golden; that students could and did dictate to the professors, and that the latter could not enforce discipline, except in so far as they truckled to cheap political influences. We must apprise the people of Colorado that no mining school in the country has for years borne so dubious a reputation in this respect, as being the playground for politicians, as has that at Golden. This must mean a good deal, for we have no doubt that much of this evil exists in other state mining schools; but at least nowhere else have we had it so repeatedly thrust on our attention that it reeks to heaven.

Colorado is a great state. It is a great mining state. Like California, it is the mother of miners. It has one of the most advantageous locations on earth for a mining school, and its school should rank among the highest. It does not. One needs more than air and scenery and mines and great miners and notable engineers and husky students and devoted professors for a great school. A high academic standard of ethics and of scholarship is the indispensable thing, far greater than all else; and, according to all common report, understanding, and evidence, these essentials Golden has not had.

What we say is explicit, because we should like the mining people of Colorado to clean house. They cannot afford such continuous evil rumors. To play politics in an institution of learning is to play Hell: keep them apart—the two are as essentially separate as night and day.

The Opportunity of the Reno Experiment Station

THE Rare and Precious Metals Station of the Bureau of Mines, which has been driven away from Golden by the authorities of the Colorado School of Mines, and which is to be re-established at Reno, has outlined an elaborate program of work. A résumé of the problems regarded as being in need of immediate study was given in our columns two weeks ago. If only a small percentage of the dreams and hopes of the directors come true, the mining industry will benefit greatly. The work outlined is along metallurgical rather than mining lines, as is natural, for that field offers more opportunities for research.

An investigation into the cyanide process with a view to reducing the losses is announced. With continued high prices of silver assured for some years, this is a matter of considerable importance. The old chloridizing roasting process preceding cyaniding may offer possibilities under present conditions. Or the Western Precipitation Co's. volatilization process may be attractive if not too expensive.

There is room for much experimenting. It is to be hoped that private investigators will make known what they have done either through the columns of the technical press or by direct consultation with the Bureau, so that work will not be needlessly duplicated. Experiment-station activities are of the most benefit to the industry when co-operation exists in the fullest degree.

Another important problem is that of extracting the copper and silver from the many low-grade oxidized ores in the country. Few high-grade deposits are left; the U. V. X. is one. At many properties, not only has the cream been skimmed off, but the cow has stepped in the milk-pail. Considerable work has been done by some of the large companies such as the New Cornelia, Chino, Miami, Anaconda, and Utah Copper, but the results are not in general available to the smaller operator. To be

sure, operations of this kind are pre-eminently large-scale problems, but the Bureau can do much in bringing the latest facts concerning leaching before the mining public, so that all interested may have a better understanding of what is and what is not possible. The cheap production of sponge iron for precipitation may well be studied.

One of the twenty remaining lines of investigation is to be a study of the methods used in crushing ores and a comparison of results secured by different machines. This would give exceedingly interesting data. Many excellent crushing and grinding machines are on the market, claims for which are most conflicting. Then the new types of rod mills which have been devised by F. E. Marcy and David Cole should be given immediate attention. Under what circumstances are they better than ball mills? Practically every reduction plant, no matter how small, has a fine-grinding mill, and will be thankful for guidance.

As we mentioned last week, the Bureau of Mines experiment stations have not always been unqualified successes. We hope at a later date to be able to say some nice things about this latest installation. We hope that the new Reno station will eclipse for efficiency the reputation of the city's divorce mill.

The Company Store and the Co-operative Store

THE central store in a mining camp in its various phases has been both the worst and the best of institutions. The company store in its old-fashioned form was often a means of exploitation, if it did not so originate. In some cases miners who did not trade at the company store would be discharged, a clear evidence of the profiteering nature of the undertaking; especially since the only reason that a miner could have had for trading elsewhere was that he could thus do better. In some mines, especially those in remote places, where a central store was clearly advisable, the profits from the company store were used to cover up sloppiness in the mine management. It was of less importance how much was paid out for operating expenses, if all, minus the wholesale cost of a certain amount of food and clothing, came back to the company's coffers. It so came about, therefore, that the company store acquired in many places a dubious reputation; and for that reason many companies declined to venture into such an institution, which was sure to be suspected even though properly conducted.

The lack of a central store, however, has proved in many places as bad as the rapacious company establishment. For the one big concern, which may or may not be profiteering, comes a horde of little ones, with high operating costs, and all profiteering to the best of their ability, according to the general principle of retail trade. Especially in these days of high cost of everything, the high overhead expenses of such little stores have contributed to bringing prices so high, not only in mining camps, but elsewhere, that they have become well-nigh intolerable; and the general trend of advanced thought has been toward larger central stores, with a less percentage of overhead, and a less margin of profit. Even before this, many if not most of the company's stores, established by necessity, for the convenience of miners, in remote camps, had completely reacted from the money-making idea; and the store had been managed like any other department of the mine, and required only to pay its actual cost of maintenance, as, for example, at the Eden mine in Nicaragua. The margin of retail profit in such cases was fixed so as just to cover the cost of administration, say at 10 per cent, while the outside retailer's profits would have been 20 or 30. In this form the central store becomes an unmixed economic blessing. As an example of the change of the feeling against the central store is the recent action of the striking miners at Tonopah. Becoming convinced that the Tonopah companies could not afford to pay the increased wages which they felt they needed, to cover the high living costs, they agreed to a central store operated by the companies, in order to reduce to a minimum the retailer's profits.

But how shall miners know how to distinguish between the company store which is established, like the hospital, as part of the necessary plant, and the grafting store? The company must not only avoid profiteering in goods essential to plain living, but the suspicion of profiteering. And the development of the company store in the direction of a co-operative store has solved this difficulty. A margin of profit is fixed more than sufficient to cover running expenses and the net balance is repaid to purchasers at the end of the year. This is the solution at Ajo, where in addition a committee of workmen inspects the functioning of the store and helps advise concerning it. The institution then becomes ideal. In many cases, in foreign countries, the character of the population may be such that this co-operative plan, which presupposes intelligence of the native American type in the purchasing class, would not work out satisfactorily: and the stores must be run as they are at Chuquicamata, with an endeavor to break even. According to the article by Mr. Guggenheim in this issue, so far they have lost money. Therefore, the co-operative plan is the more accurate, where it is feasible.

It is not at all impossible that the co-operative store may be so perfected in our mining camps that it will become more practicable than it has hitherto proved, in older and more diversified communities.

Anti-Metric Propaganda

THE anti-metric propaganda people are sending out stuff that we could improve on ourselves for effectiveness. The latest batch contains a letter from a man who has been in Norway, where the metric system has been legitimized. He observes:

"From my experiences in Norway and Sweden, I am much averse to changing the system in use in this country, because of the confusion due to the conglomeration of terms that creep into use." Also, he says, "I later discovered that the Swedish metal industries use no less than four systems of measurement: in Norway, there are three systems." He evidently prefers to retain the old confusion rather than follow the universal and logical system into the light of simplicity.

Also, the propagandist relates this fable: "A lady on being told how easily the metric system could be learned, replied, 'I do not believe I could ever learn the meter, so as to think of it other than one yard, three inches, and a little more.'" Enough! We are convinced by the fable of the "Lady and the Meter." We are tempted to put it into a limerick:

A lady who could not be sweeter,
Remarked to a writer named Peter,
"I know what's a yard,
But a meter is hard."
Said Peter to us, "You should meter."

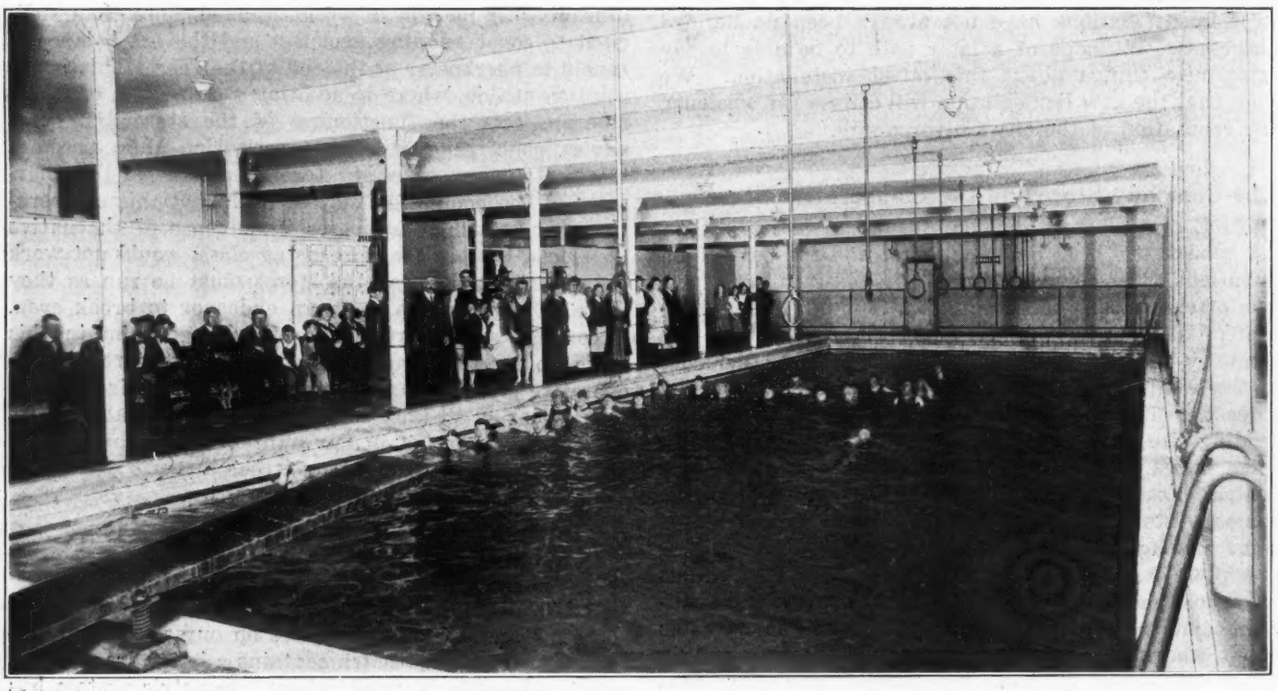
Welfare Work at the Homestake Mine

Avoidance of Paternalism, a Lively Interest in Clean Amusement, and Development of the Community Spirit Have Been the Guiding Influences in Shaping the Human Engineering Plan Followed by the Homestake Mining Co.

By B. C. Yates*

Written for *Engineering and Mining Journal*

MEN and women, to be happy and contented, should have definite work to do, have amusement, and must be allowed to develop their home and community life largely in their own way. Welfare work, to accomplish the most good, must help the people of a community in their daily work, their amusement, and their home life. It should be developed gradually and naturally as the needs of the community are manifested and should never be conducted along fixed lines laid down by a single individual who perhaps lacks full appreciation of human nature. Paternalism should be avoided as far as it is possible to do so in a community where a single business interest dominates. The needs of the people should be carefully studied and anticipated; and the one central idea that each individual employee is a part of the organization—that he is not a machine but a human being with the usual characteristics of the species—must govern if the work is to be successful.



DURING THE PLUNGE PERIOD. SWIMMING TANK IN THE HOMESTAKE RECREATION BUILDING

Although the management of the Homestake Mining Co. has always possessed an active interest in the general welfare of the community, it has never undertaken to furnish houses for its employees. It has, however, encouraged the building of homes by giving free permits to occupy company ground and by advancing the purchase price and allowing the employee to pay on the monthly payment plan, with a low rate of interest on deferred payments. After forty years of continuous operation as the sole industry of the community there are few company-owned houses in Lead. Under this policy the town has grown from a typical mining camp, with its log cabins and board shacks, into a modern small city, with paved streets, sewer and water-supply systems, electric lights, and beautiful homes, owned largely by their occupants. The grocer, the butcher, the hardware dealer, the clothier, and the real-estate man carry on their business in this mining camp as in any ordinary town of equal size. Keen competition keeps up healthy trade conditions and maintains prices at a reasonable level.

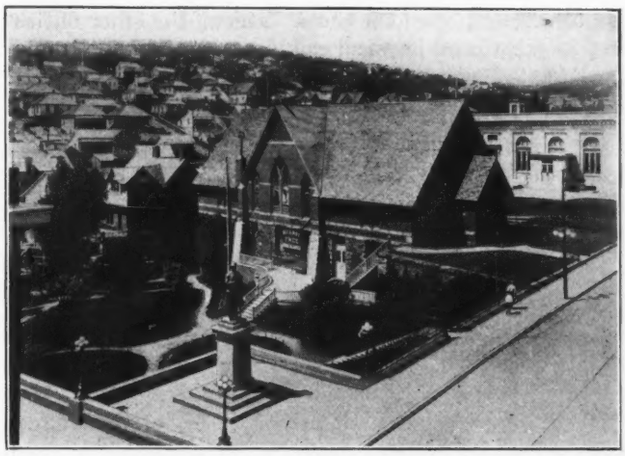
No part of the welfare work at the Homestake has met the needs of the people more fully than the Free Library, originally a Christmas gift from the late Phoebe A. Hearst in 1894. It was maintained by her beneficence until her death, and is now carried on through the generosity of her son, William Randolph Hearst. The library was first installed in the Miners' Union Building, moved in July, 1896, to a room over the Hearst Mercantile Co. store building, where it remained until 1914, when it was moved to its present quarters on the second floor of the recreation building.

The first volumes placed on the shelves were such as would appeal to the average reader to be found in an early-day mining camp. The number of volumes has

*Superintendent, Homestake Mining Co., Lead, S. D.

been increased yearly, and the standard of the literature has been consistently raised until now the library contains approximately 13,000 volumes. In the reading room are eighty periodicals, of which two are foreign, and twenty-two newspapers, of which two are foreign.

The close proximity of the high school enables the library to render valuable assistance to teachers and pupils, and the grade teachers use the library freely for reference work. Much assistance is also given to the literary clubs of the town. The magazine collection, with its adequate guides, is especially useful in this work, and each year makes this section more valuable. The library is also used extensively by non-residents from surrounding towns.



KINDERGARTEN AND YARD AT LEAD, S. D.

When the library was opened forms of amusement were scarce in Lead, so it was, in a measure, made a community center. Musical programs were given at intervals and musical organizations and literary clubs used the room as a meeting place. Its use by all nationalities and ages has grown until now the services of a trained librarian and two assistants are required to care for the needs of its patrons.

Besides the excellent collection of books, there are a number of beautiful paintings on the walls. A smoking room is provided for the men, and the children have an alcove for their particular use, provided with low tables and suitable chairs. One end of the stack room is used for mineral exhibits, especially the minerals of the Black Hills region. In short, this is the most complete and best-housed library in South Dakota.

Influence of the Kindergarten on Americanization

The kindergarten, opened in 1900, is also maintained by the generosity of the Hearst family. Sessions are held five days in the week, from the the first of April until the Christmas holidays. A trained kindergartner with from two to three assistants is employed. Children between the ages of four and six are admitted, the older ones attending the morning session and the younger the afternoon. The work is carried out on the latest approved lines, and the school is well supplied with models, sand tables, piano and other aids to interest children.

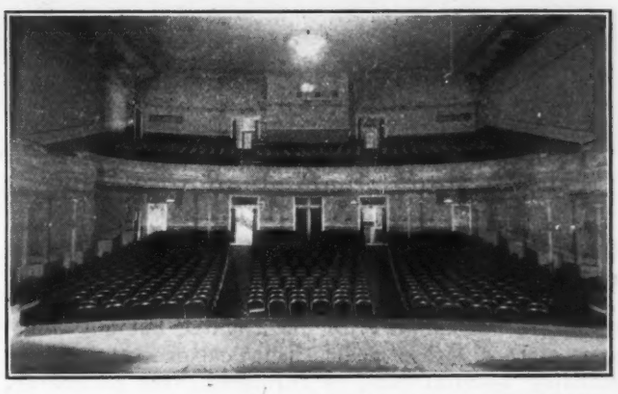
A small but well-kept park nearby provides a place for outdoor play during the summer months. The kindergarten has been an inestimable aid to the public school by giving the children of foreign birth a start in the English language and teaching them something of American ways and manners, thus relieving them of the handicap resulting from their foreign parentage. It has also proved a large factor in Americanizing the parents by both direct and indirect contact with the teachers. Entertainments are given frequently by the pupils, to which the parents are invited, and these are always well attended, especially by the mothers. Frequent visits to the homes by the teachers also tend to awaken and keep up the interest of the parents in things American. The average attendance under normal labor conditions at the mine is about 125 for the two sessions.

The Public School in Welfare Work

Although the public schools of Lead are supported by general taxation in the usual way, it is not out of place to mention them in connection with the welfare work of the Homestake company, inasmuch as it pays the larger part of the taxes for their maintenance and has always favored a liberal policy for the schools. The Lead public schools are second to none in the state from the viewpoint of excellence of teaching force, equipment and work accomplished.

In the department of science the school is especially strong. Scientific schools of the country bear evidence to the high quality of its graduates, one state school testifying that no Lead graduate has ever failed to make a high record in the institution. Manual training, domestic science, music and art are taught by special instructors, and a complete business course is given. An instructor in athletics is also employed, and the interest in football, basket ball and track meets is most active, the basket-ball team having won the state tournament in 1918. The school maintains a library of about 13,000 volumes in addition to the Hearst Free Library and employs a professional librarian to facilitate consultation.

The attendance in the high school has increased more than 100 per cent in the last three years. This increase comes almost entirely from Lead, as few attend from



AUDITORIUM IN THEATRE, RECREATION BUILDING

surrounding territory. The number of graduates who attend higher educational institutions is also large in proportion to the attendance.

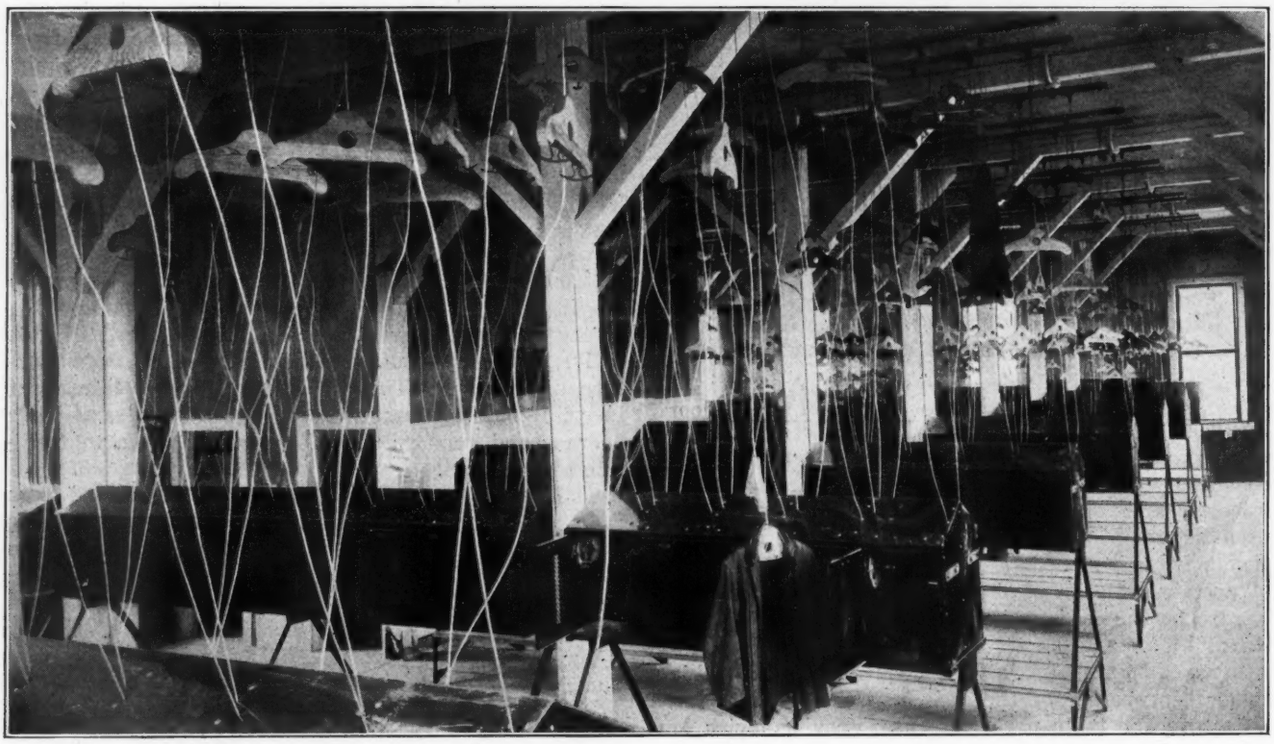
The Homestake company, in supporting a liberal policy toward the schools, feels that it is fully repaid by the stabilizing influence on its working force, due to the fact that men with families are attracted to Lead on account of its educational advantages. Many of the young men now holding important positions in the shops, mills, assay and engineering departments are graduates of the Lead high school.

From 1879 until 1906 the hospital department was conducted under the contract system. Each employee paid $1.10 into the hospital fund and was furnished free hospital and surgical care in case of injury and a reasonable amount of medical and other surgical care for himself and dependents. Under this plan the company engaged the chief surgeon and he employed his assistants. There were frequent dissensions over charges for border-line cases; and, inasmuch as the employees who furnished the funds for maintenance had little or nothing to say about the management, much dissatisfaction was constantly manifested. On Jan. 1, 1906, the Homestake company discontinued the hospital assessment against its employees and assumed the entire cost, thus initiating what is believed to be the first free complete industrial medical service for employees and their dependents. All employees and their dependents are furnished free medical, surgical and obstetrical service of every nature.

Because of lack of room, uncomplicated obstetric cases are not admitted to the hospital, but any other type of case, either medical, surgical or obstetric, demanding hospital care, is furnished, free of charge, whatever is necessary. Employees may employ outside doctors and pay for such services themselves. To carry on this work seven physicians are employed, all graduates of high-class medical schools and experienced both in industrial medicine and general practice. (Recently one of the assistants has been appointed chief surgeon for a large copper-mining company in South America.)

The hospital building is getting old, and in the near future will be replaced by a more commodious and up-to-date one. The equipment is, however, modern and complete. Among the special features of the equipment to be noted is the X-ray outfit, which is now considered one of the necessities in a present-day industrial hospital. Twenty beds are maintained and seven graduate nurses are employed to look after the patients. The medical work is done entirely by doctors, the nurses not being permitted to do routine dressings, give anæsthetics, do X-ray or perform or other laboratory work. It is the opinion of the management that this method is more satisfactory to the employee and is certainly safer from a medico-legal viewpoint. The company spends annually about $60,000 in keeping the hospital service at the highest degree of efficiency.

In addition to the regular duties, the medical staff devotes much time to the general welfare of the community, the chief surgeon having served as city health officer for many years, and to his faithful work in this office is due in large measure the generally clean and sanitary condition of the town. Among the other duties may be mentioned physical examination of all applicants for employment, medical supervision of the employees, mutual-aid association, locally known as the Homestake Aid Fund; promotion of first-aid and safety work in an organization employing normally about 2,500 men, and giving expert medical assistance in handling the welfare work of a modern industrial city of eight thousand population.



INTERIOR OF HOMESTAKE CHANGE HOUSE, SHOWING LOCKERS AND CLOTHES-DRYING SYSTEM

The Homestake recreation building, built and equipped by the Homestake Mining Co. at a cost of $250,000, was opened to the public on Aug. 31, 1914. It is a three-story brick-and-stone structure of the latest design, and is well lighted, heated and ventilated. No expense was spared to make this the recreation home of the employees and their families, and all residents of Lead are given the same privileges as employees, so that it is a community house in the fullest sense. No membership fee is charged and no card or number used. Everybody is welcome and all are treated as special guests by the attendants. The building has always

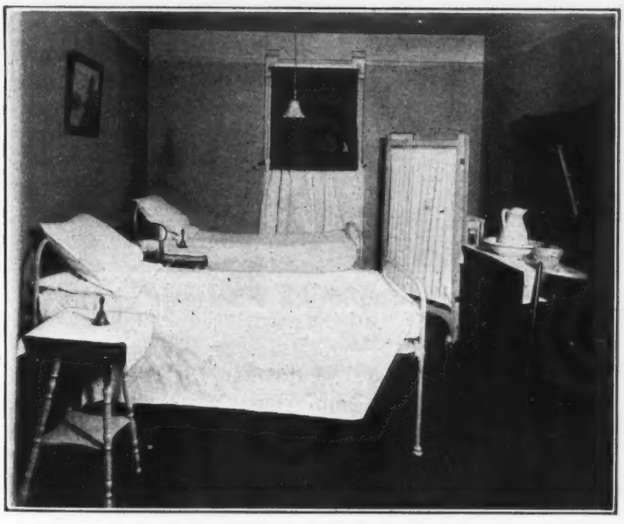
been conducted on the open-house plan, no hard and fast rules have ever been made, and each guest is allowed perfect freedom so long as his conduct is not objectionable. The only rules posted are those governing the length of time one set of players may use the various tables and games, and specifying the days when the men, women and children may use the plunge. The results from this method of handling the building have proved most gratifying to the management and seem to be appreciated by the patrons, as the average monthly attendance is about 25,000.

On the first floor of the building is a large rest room furnished with easy chairs and lounges, with tables for chess, cards and other games, and directly in the rear of this room is the billiard room, with two regulation billiard and two pocket-billiard tables. In alcoves of the rest room are three tables for children between the ages of six and sixteen. About 2,500 persons play on these tables during a month.

Below the rest room is the gymnasium and a bowling alley of six alleys equipped with automatic pin setters. Over 2,000 persons use these alleys each month, including the ladies, who have one day each week. The gymnasium is well equipped and is also used by two bands as a practice room.

In the rear of the rest room and with a separate street entrance is a well-furnished theatre with a seating capacity of 1,000. Moving pictures are shown, both afternoon and evening, with road shows and vaudeville when available. The average monthly attendance is about 20,000.

Under the theatre auditorium and directly in the rear of the bowling alley is a tank 25 by 75 ft. with a depth of water ranging from 4 to 9 ft. The plunge and floor are lined with white tile. Change rooms, shower baths and hair driers are provided for the bathers. The water is heated, filtered, disinfected and changed frequently. The plunge is patronized by approximately 1,800 persons per month, about equally divided among men, women, boys and girls.

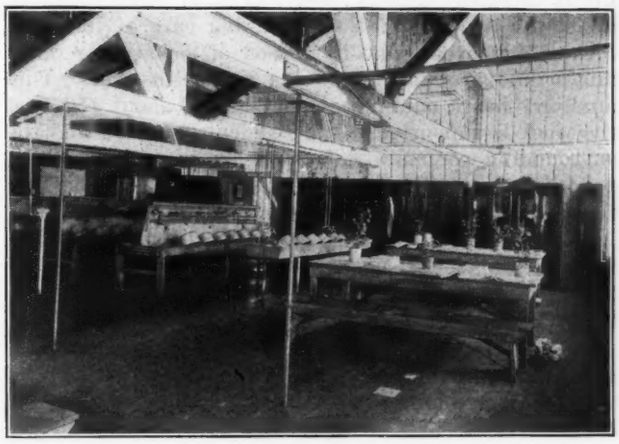


A TWO-BED ROOM IN THE HOSPITAL

A small room called the sun room, because of its particularly sunny exposure, is used as a meeting place by various clubs, societies and committees.

There is no charge for the use of any part of the building to Homestake employees and their families or to residents of Lead, except for the theatre, where a nominal charge is made to cover cost of pictures and other attractions.

A manager of the building, who is also in charge of the theatre, with assistants in the various departments, is always on hand to look after the needs of the patrons. The use of the building by all nationalities and ages has been most gratifying, and it has become a great welfare center where Americanizing and humanizing influences are constantly at work.



MACHINE SHOP, WASH AND LUNCH ROOM

EMPLOYEES' MUTUAL AID ASSOCIATION

After a careful canvass of the sentiment of the employees, the Homestake Aid Fund Association was started in 1910. A board of five directors was elected by ballot and held their first meeting July 16, 1910. These five directors, elected annually, with the superintendent of the company as treasurer, and the chief clerk as secretary, direct the affairs of the Aid Fund, receive applications for aid and direct payment of claims. Its decisions are final in cases of dispute. All employees of the company contribute $1 per month, and, up to the time the South Dakota Compensation Law went into effect, the Homestake company contributed $1,000 per month. Benefits were paid for both accidents and sickness until the state law made it obligatory upon the mining company to pay all compensation for accidents, after which time the Aid Fund has been used to pay sick benefits only.

Originally $1 per day was paid for loss of time from either sickness or accidents, beginning the day of the accident or after the sixth day, in case of sickness, and continuing for a period of six months from date of disability. Later the time was extended to nine months and the benefits were increased to $1.50 per day if the sickness continued beyond three months. The sum of $800 is paid to the beneficiaries in case of death and $200 if a member commits suicide or falls a victim to insanity.

Benefits paid up to April 1, 1920, are as follows: Account of death, $195,200; suicide, $1,000; insanity, $1,400; sickness, $91,183.11; injury, $75,498.25; making a total of $364,281.36.

At the time of the influenza epidemic in the latter part of 1918 the fund carried a balance of approximately $40,000, but this was entirely wiped out, and the fund now has a deficit of about $7,000, which the Homestake Mining Co. has assumed.

Although the Homestake company does not now contribute regularly to the Aid Fund, it does pay to all injured employees $1 per day for all time lost from accident up to the tenth day, at which time regular compensation payments begin in accordance with the state law.

The Ladies' Auxiliary to the Aid Association is a purely charitable organization, liberally supported by the Homestake company, and was organized in 1909 to assist the Aid Association in taking care of the families of employees, who by reason of sickness or other misfortune are unable to care for themselves. This auxiliary has a paid-up membership of about 150, and the work is supported by all residents of Lead and the surrounding communities which are more or less dependent on the Homestake industry. A membership fee of 25c. and monthly dues of 10c. furnish a small income, which is augmented by donations and receipts from the annual Labor Day picnic, which is given under the auspices of the auxiliary, and from other entertainments given during the year.

A relief committee consisting of two members from each ward is appointed annually, whose duty it is to visit the sick and needy and furnish relief when necessary. An average of thirty-five families are helped each month, and the work has grown until any needy family, whether employees of the company or not, is given aid. Since the end of the Great War, the local Red Cross organization has turned over to the auxiliary the work of taking care of those families left destitute by the death of the bread-winner, either while in the service of his country or from the influenza during the epidemic of 1918 and 1919.

The company began the practice of retiring its old employees, on account of old age or physical disability, July 1, 1917. The basis of computing rate of pay after retirement is as follows: 25 per cent of last full year's pay plus $10 per year for each year's service with the company, but not to exceed $600 per year.

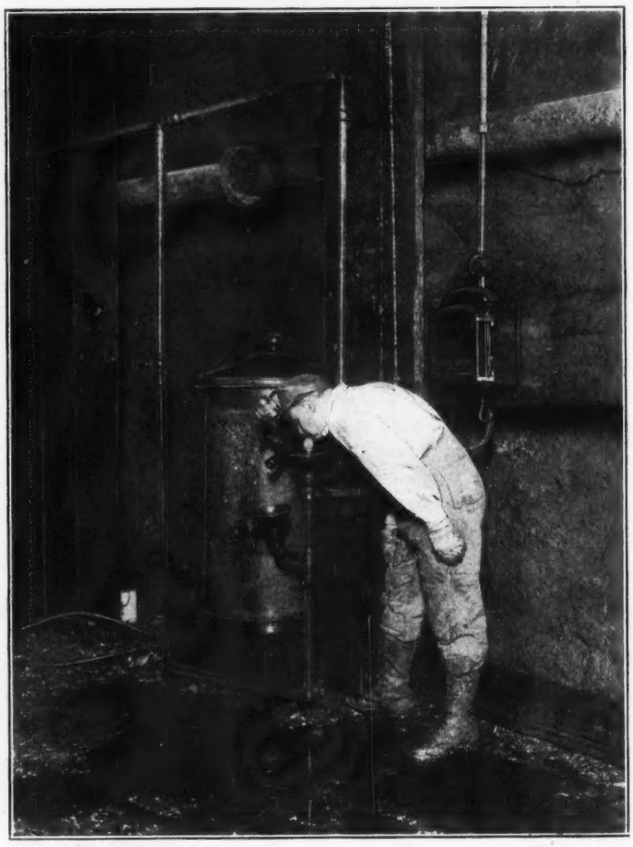
An employee may make application for a pension, in which case the application must be approved by the head of the department in which he works, or he may be retired upon request of his foreman.

There are now forty-two men receiving pensions of from $350 to $600 per year. The average age of those receiving pensions, at the time of retirement, was over sixty-five, and the average years of service nearly thirty-one. Nine pensioners have died and one pensioner was re-employed. A pension is also paid to widows of employees who lost their lives by accident prior to the enactment of the state compensation law. Each woman entitled to this pension is paid $30 per month, with an additional $5 for each child under sixteen years old.

At a meeting of Homestake employees of twenty-one years of actual service, held in December, 1905, an organization was effected and a constitution adopted. This organization is known as the Homestake Veterans' Association and was formed for the following purposes: To gather together the older employees of the Homestake Mining Co.; to make a record of past incidents relative to the mine and its first employees; to extend such voluntary aid to needy members of the association as may be determined by majority vote, and to cultivate and keep alive a more lasting acquaintance among its members. The qualifications for membership are as follows: At the time of making his application, the applicant must be in the employ of the Homestake Mining Co. and shall exhibit satisfactory proof that he has been in the active service of the company or associate companies for not less than twenty-one years. He must bear a good moral character and be recommended by two veterans in good standing.

The association started with a charter membership of 103, and the membership at the present time is 157. Employees who have been retired on pensions do not lose their membership. In charity work, not alone among its members, but throughout the community, the association has spent over $6,000, which does not include substantial subscriptions to the Red Cross. The treasury holds $2,100 in Liberty bonds and cash.

The employment department was started in 1904. Previous to that time, men were hired by the foreman and bosses. For several years men for the mine only were hired through the employment office, as there were no rules or precedents to follow. At first only the name, nationality, age and experience of the applicant were recorded. Later, the work was enlarged, until now all labor is hired by the employment office and an application blank is filled out and signed by the applicant, physical characteristics, date and place of birth, weight, height, color of hair and eyes, condition of health, personal history, religious and political affiliations, name of nearest relative, and at least one good reference being recorded. Later, when the employees' insurance was put in force, all applicants were required to pass a physical examination. This serves to insure getting only physically sound employees and to protect the members of the mutual insurance association.



UNDERGROUND DRINKING FOUNTAIN AT THE HOMESTAKE

Early in the work it was found that men are greatly influenced by their first reception. The employment office is the company's front door, and the applicant is made to feel at home and given to understand that he is employed as an individual and not a mere part of a mass, and that the humblest position is just as essential as the highest. The rules of work are explained, and a printed book of rules is handed each successful applicant. He is asked whether he has a place to room and board, and if he has none is directed to several where he can make his choice.

All employees' records are numbered and condensed on cards, which are filed alphabetically, one group for employees and one for ex-employees. When a man leaves the service of the company he gives his reasons when he draws his time. His immediate boss also makes a statement, which is recorded, as to why the man left. Both reasons are copied on the man's card for future reference. When a request is made by some future employer for a man's record, a notation with the address is made on his card, and like requests are made of former employers, especially if the man's work is not entirely satisfactory.

At the end of each month a report is made showing number of men hired for the month, with certain statistics such as nationalities, ages, married or single, and under what bosses placed; also the number of time checks issued for men leaving each boss and the reasons for leaving as given by the man and boss. This department has hired 19,250 men since its organization.

Outside of the regular work of employment, the office keeps a list of all employees who are not full citizens of the United States, and gives all assistance possible in completing their citizenship papers.

In keeping with the policy of the company of looking after the welfare of its employees, a safety engineer was added to the staff in 1917, and a regular organization effected to look after matters pertaining to safety. A workman's committee, made up of men from all departments, with the safety engineer as chairman, meets once a month. The members of this committee report any unsafe practice or condition which they may have observed during the month and discuss matters pertaining to safety. If the condition needs immediate attention, the safety engineer is notified and the remedy is applied without waiting to report to the committee. A central committee, consisting of the superintendent, as chairman, and the heads of departments, meets the week following the workman's committee to act upon the recommendations of the workman's committee, and also to consider safety measures on its own initiative.

The importance of the safety movement is impressed upon the employees by posting bulletins of the National Safety Council, and local bulletins, and by publishing the Homestake Safety Bulletin, containing timely remarks, clippings from other safety publications, and records showing injuries sustained during the month in each department. The mine department is divided into six competitive divisions to stimulate inter-department competition. Shift boss records are also given showing accidents under each one.

Every month each foreman in charge of a mine division receives a slip showing his standing and a comparison with the total mine record for the previous month, together with remarks on practices observed and injuries sustained in his territory during that period. Each shift boss also gets a monthly tabulated comparison of all bosses together, with remarks on practice observed and injuries sustained by men under his supervision. The general mine foreman gets a copy of all these letters.

All dangerous places and mechanical appliances are properly safeguarded, both underground and on the surface. Goggles are furnished free to all men working under conditions hazardous to the eye. First-aid material is available on each level of the mine and in shops and mills. Safety suggestion boxes are placed at accessible points around the works. Men are trained in the use of mine rescue apparatus and in first aid to the injured. During 1919, 127 men were trained in mine rescue work and 204 received first-aid training. This work was under the supervision of the staff of the U. S. Bureau of Mines Car No. 5, and those successfully completing the work hold a Government certificate.

All major accidents are thoroughly investigated by the safety engineer as soon as possible after the accident. The accident severity rate has been materially reduced and the frequency rate slightly reduced, although the labor turnover has been rapid. On the whole, the results of the safety work have been satisfactory, and demonstrate that if each individual workman can be interested much more can be accomplished.

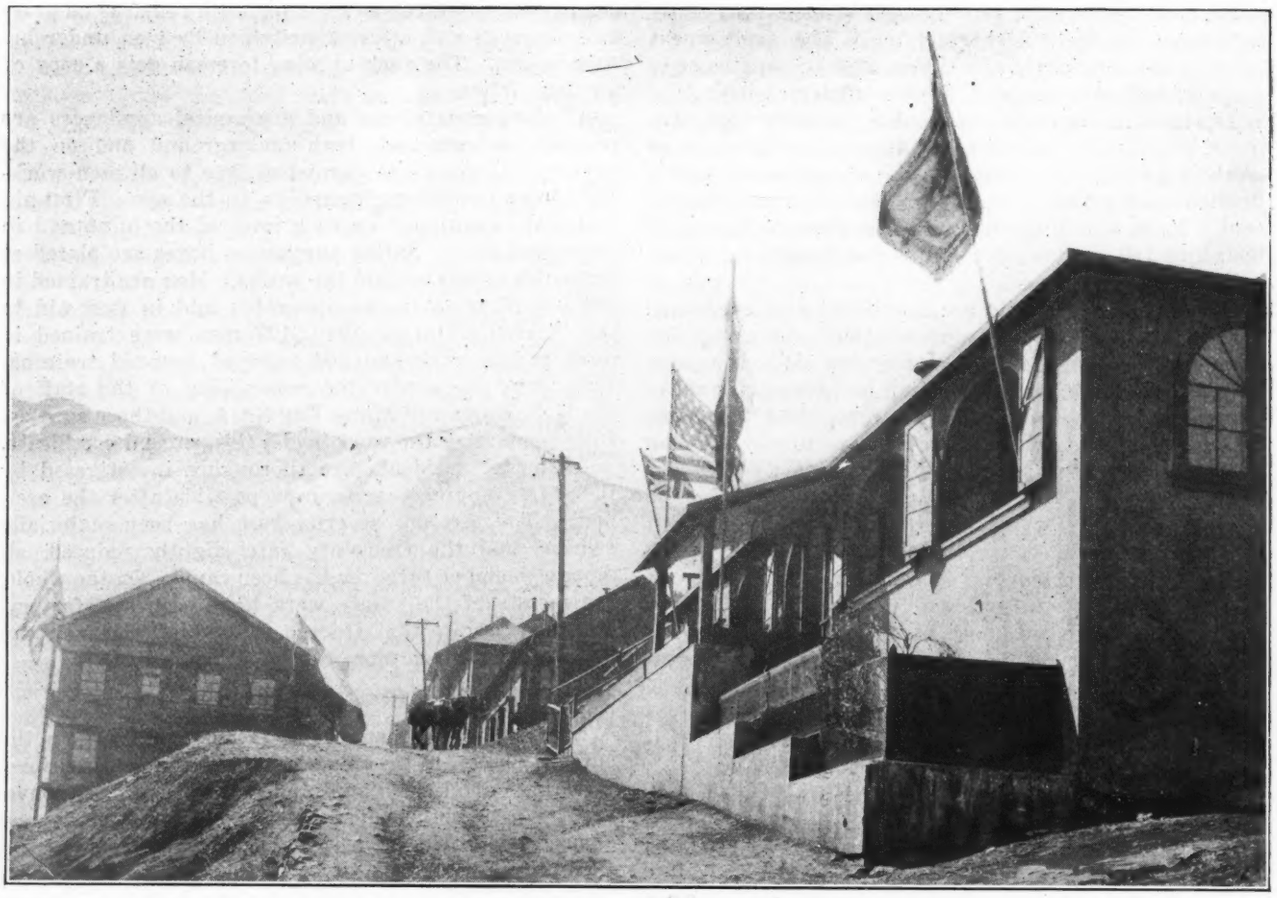
Sanitary Measures

Every effort is made, both in the mine and in the surface plants, to provide sanitary working conditions. Bubbling drinking fountains are placed in convenient places both underground and in the mills and shops, and provided with clear, cold, wholesome water. Clean, well-heated and ventilated change rooms are provided with hot and cold water and individual lockers for clothes. A special underground latrine is used in the mine, which is brought to the surface frequently and thoroughly cleaned. At convenient places near the shops and mills special toilet rooms are placed, which are kept clean by the constant attention of an attendant, who gives his entire time to this work.

Ventilation of the underground workings and dusty crusher rooms is carefully supervised. Much time and attention have been devoted to the introduction of water machines for drilling, until at this time only a small percentage of the men underground are working in dusty places. In these and in many other ways the Homestake company is daily doing something practical to better the working conditions of its employees.

Many religious denominations are represented in Lead and most of them have an organization and a place of worship. The Homestake company makes a yearly contribution of $200 to each church holding regular services, and renders other material aid in various ways. Though impracticable to cease all operations on Sunday, it has been the practice for some time to allow one-half of the force of certain departments to lay off on alternate Sundays and individuals may take their Sundays off if so desired. Church services are well attended and the financial condition of the churches is generally good.

[Note: The author wishes to thank publicly the members of the staff, F. A. Henderson, superintendent of schools, and Miss M. E. Livingston, librarian at the Hearst Free Library, for their valuable assistance in preparing this article. All photographs are by Art Lease, of the engineering department.]



MAIN AVENUE OF AMERICAN TOWN SITE, BRADEN, CHILE

Building Mining Cities in South America

A Detailed Account of the Social and Industrial Benefits Flowing From the Human Engineering Work of the Chile Exploration Co. and the Braden Copper Co.—Organization, Administration and Conception of the Objects Sought

BY HARRY F. GUGGENHEIM*
Written for *Engineering and Mining Journal*

IN EVERY department of human affairs, "practice long precedes science." To this dictum of John Stuart Mill the welfare movement in the so-called Guggenheim companies has been no exception. The welfare work of the Chile Exploration Co. and of the Braden Copper Co. in Chile is approaching what might colloquially be called a science, which has been preceded by and is the result of experience gained in "common-sense" welfare work practised over a long period of years in mining camps in different parts of the world. These two companies, on account of their isolation and the magnitude of the operations centralized at one point, have lent themselves to the development of welfare work similar to that practised in some of the large progressive industrial works but unusual in mining camps.

The Braden property is situated in a steep mountainous region at an elevation of from 7,000 to 8,000 ft. It was a region without permanent inhabitants. The mines originally were worked in a small way during the summer, but owing to the rigorous climate and the very heavy snowfalls, which cut off communication with the outside world, the region was practically deserted in the winter months.

THE CHUQUICAMATA PROPERTY

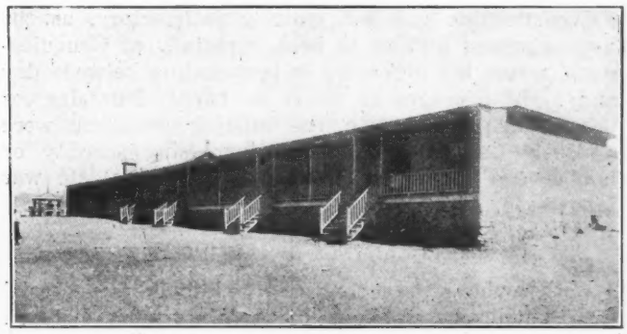
The property of the Chile Exploration Co., known locally as Chuquicamata, is on a high plateau with much less precipitous mountains in the background. The elevation is 10,000 ft.; the climate dry and without seasonal extremes of temperature. It was not a settled country, because of absence of fresh water in the vicinity.

From this it will be seen that these companies had not only to develop and equip their mines, but they had to build railroads and to establish towns, or if you please, cities, complete, sufficient to house from 10,000 to 15,000 inhabitants, and to supply them with food, water, and other necessaries, as well as to keep them clean, healthy, and content.

*Vice-president (in charge of operations) and chairman of executive committee of the Chile Exploration Co. Vice-president Braden Copper Co.

Work at the Braden property began in 1908. It was first developed and equipped for the production and treatment of 3,000 tons of ore daily. In 1915 it was found that the property warranted greater production, and the necessary plant and housing which will place the mine on a basis of a daily production of 10,000 tons of ore is rapidly nearing completion. It has normally at present a population of about 12,000.

Preparations for working Chuquicamata began on a large scale in 1914, and operations were at first on



TYPE "C" ADOBE HOUSES AT CHUQUICAMATA

a basis of the production of 5,000 tons of ore daily. This was rapidly increased to 10,000 tons, and at the present time the plant has a capacity of 15,000 tons per diem. The eventual capacity will be 30,000 tons daily.

ORGANIZATION OF WELFARE WORK

The important steps in the evolution of the welfare movement in these South American properties grew from conditions of sufficient practical value to warrant a summary. The welfare problems at these properties are divided into two classes, one for the so-called "staff" employees, consisting of Americans, Chileans, and Europeans, and the other for the workmen, who are in the very great majority Chilean and who have had few of the advantages enjoyed by citizens of rich and more industrially and culturally developed American and European countries.

The first attempts at welfare were made by the general managers of the properties with funds appropriated for specific purposes as the necessities became evident. The base of this work was hygiene and amusement for the Chilean workmen and recreation for the staff. Early in 1915 it was realized that, although much more money had been spent for welfare construction by the Chile Exploration Co. than by the Braden Copper Co., at the latter property the spirit of contentment and the real progress of the community, which should be the end in all welfare work, were much more marked. The conclusion reached was that the success at Braden was in a large measure due to the efforts of Mr. B. T. Colley, who was then smelter superintendent and who in addition to his regular duties was in charge of welfare.

SELECTING A WELFARE MANAGER

The results of the right man spending but a part of his time on welfare were so successful that it was decided to employ a welfare expert to devote his entire time to this work at the two properties. At that time the field from which to draw for welfare experts was very limited; and the writer, after spending much effort in the search for a welfare expert with knowledge of Latin American people, and with the personality needed in a mining camp, decided that the "expert" qualities, though desirable, were less essential than personal qualities. Mr. Colley possessed the personal qualities; and, heretical as it then was to make of a smelter superintendent a "welfare manager," he was put in charge of the welfare development at the two properties. He knew the Latin American laborers through many years' experience with them; appreciated their abilities and their weaknesses; and primarily had a real interest in their development and a profound faith in the general proposition that humanity progresses.

After several years in the welfare development at the two properties, local organizations were evolved and became a part of the general organization of the plants, with department heads reporting to the respective general managers of the properties. Mr. Colley was then placed on the headquarters staff in New York of the firm of Guggenheim Brothers, that he might act in the same capacity for properties under the management of the firm in regard to welfare problems as the heads of the engineering departments act for their respective subjects. The following is a summary of the duties of the Welfare Department of Guggenheim Brothers as set forth in the organization circular of that firm:

"To make a continuous study of the development of welfare methods in all parts of the world.

"To maintain an organization capable of performing the following functions for and through the chief executive of any of the companies under the management of the firm:

"1. Advise regarding welfare policy.
"2. Study welfare reports.
"3. Study requisitions and tenders for welfare work.
"4. Decide on the selection of welfare personnel.
"5. Supervise requests for welfare appropriations."

DEVELOPMENT OF WELFARE DEPARTMENTS

The last step in the development of the welfare movement has been the amalgamation of the welfare and personnel departments. The personnel department had its origin as a part of the headquarters organization

TYPE "A" ADOBE HOUSE AT CHUQUICAMATA

with the function of carefully selecting "staff" personnel for the properties. With the fund of experience that has in very recent years been accumulating, based on the multifarious profit-sharing plans and the even more recent plans which might be classified under the head of "Industrial Democracy," the function of the personnel department was extended to an investigation of these experiments for the purpose of adapting to South American conditions the good results that had

elsewhere been obtained. The functions of the welfare and personnel departments soon overlapped; and they were accordingly consolidated.

The welfare work in the field consists, first, in the construction of welfare facilities, and, second, in the operation or proper use of these facilities. The plan may be outlined as follows:

The cost of construction work at the Braden Copper Co. has been about $2,500,000, and at the Chile Exploration Co. about $3,600,000. Prior to undertaking the extensive construction of the housing and welfare program determined upon in 1915 the local conditions at the respective properties were carefully studied and plans prepared for standard types of houses for various classes of employees as follows:

Official Houses—Occupied by heads of departments. One-story cottages having six rooms, two baths, and a kitchen. The total floor space in each is 1,500 sq.ft.

Type "A" Houses—Occupied by general foremen, assistant engineers, and senior office employees. One story, with four rooms, kitchen and bath. Total floor space in each is 1,250 sq.ft.

Type "B" Houses—Occupied by sub-foremen, skilled mechanics, and junior office employees. One story, with three rooms, kitchen, and bath. Floor space, 750 sq.ft. each.

Mess Houses—Occupied by bachelors employed as junior engineers and office employees. One-story rectangular buildings of the inclosed patio type, with a living room and dining room in the patio and from nine to eleven bedrooms, a kitchen, baths and servants' room surrounding the patio. The average floor area of this type is 3,020 sq.ft.

Type "C" Houses—Occupied by high-class native foremen and mechanics. One-story, with two rooms, kitchen, and bath. These are semi-detached, built in rows of ten houses each, and the floor area of each house is 560 sq.ft.

Type "D" Houses—Occupied by native laborers and their families. One story, with either two or three rooms. The first 325 of these houses built were detached, two-family houses. All houses of this type built subsequently are in rows of ten. The floor areas are 242 and 363 sq.ft. for the two- and three-room houses respectively. Authority has been granted recently to add shower baths to a certain number of these houses that are occupied by natives that can be classed as permanent employees who have shown more than the usual interest in raising the standard of their homes.

Staff Quarters—Occupied by bachelors holding subordinate staff positions. One-story buildings, having a longitudinal hall with bedrooms on both sides. At one end is a general lounging room and near the middle there is a bathroom with a number of showers. Each of this type of building contains from sixteen to twenty bedrooms, provided with running water.

The standard types have been followed at Chuquicamata and wherever possible at Braden, but the fact that the mine and mill town-sites for the latter property are located on the side slopes of a mountain with limited space for buildings, has necessitated constructing a large number of two- and three-story apartment houses that will accommodate from four to eighty native families. The allowance of space per family is practically the same in both cases.

Plans were also made of schools, club houses, churches, hospitals, sanitary sewers, and potable water supplies. At Chuquicamata a site was selected for the native village, west of the plant, where there is ample room for enlargement, and the area has been laid out in regular blocks and streets around a large central square, which is to be utilized as an amusement park for the native employees.

The execution of these plans was begun early in 1916, at which time the most economical materials available were framing lumber and corrugated iron. The type of construction selected was wooden frames with corrugated iron roofing and siding and beaver-board partitions for the better class of houses, and sheet-iron partitions for the laborers' quarters. This type of construction was not entirely satisfactory, as the houses proved difficult to heat, especially at Chuquicamata, where the difference in temperature between day and night averages as much as twenty-four degrees Centigrade. In addition, the building operations were seriously delayed, due to the increasing scarcity of lumber and corrugated iron supplies as the late war progressed.

Utilizing Tailings in Making Bricks

With a view of securing a suitable building material for Chuquicamata, adobe bricks were manufactured locally of various mixtures of screened tailings, pampa dust and cement, and it was demonstrated that a mixture of these in proportions of 13:4:1 respectively produced adobes that were entirely suitable at a reasonable cost. Since this discovery all of the houses have been built of adobe, and the corrugated iron on a number of those built previously has been replaced with adobe. The adobe houses have proved most satisfactory. They blend attractively with the pampa landscape, maintain a more even temperature and the fact that they can be manufactured locally enables the management to add to the housing facilities as necessity demands without keping a large stock of building materials continually on hand.

At Braden, metal lath and plaster has been extensively used in place of the corrugated iron, especially in the better types of houses.

The building construction that has been done at Chuquicamata from 1916 to date inclusive is shown in the following table:

TABLE A. BUILDING OPERATIONS AT CHUQUICAMATA

Type	Number Built	Under Construction	Average Cost per House	Total Expenditure
Official, 8 room, frame and corrugated iron	7	....	$8,191	$57,337
Type "A," 10 rooms, frame and corrugated iron	11	....	3,287	36,162
Type "A," 9 rooms, adobe	5	....	8,221	41,104
Type "B," 6 rooms, frame and corrugated iron	59	....	2,119	124,990
Type "B," 6 rooms, adobe	17	....	4,580	77,854
Type "C," 4 rooms, frame and corrugated iron	24	....	1,936	46,452
Type "C," 4 rooms, adobe	28	....	3,092	86,577
Type "D," 2 rooms, frame and corrugated iron	557	29	366	204,033
Type "D," 3 rooms, adobe	336	270	802	269,491
Mess houses, total 52 rooms, frame and corrugated iron	8	....	7,025	56,198
Mess houses, 19 rooms, adobe	1	....	14,721	14,721
Staff house, total 20 rooms, frame and corrugated iron	4	....	2,565	10,259
Staff house, total 80 rooms, adobe	4	....	20,229	80,916
American club, frame and corrugated iron	1	....	128,870	128,870
American school, frame and corrugated iron	1	....	2,763	2,763
Police station, concrete and sheet steel	1	....	3,493	3,493
Native church, frame and stucco	1	....	44,966	44,966
Bakery, adobe	1	....	48,283	48,283
Native market, wood and corrugated iron and adobe	1	....	16,510	16,510
Native market place, frame and corrugated iron	1	....	8,101	8,101
Hospital extension	....	....	31,264	31,264
Converting frame and corrugated iron houses to adobe, additions to houses, and miscellaneous items of welfare construction				531,656
Total				$1,922,000

The buildings erected at Braden from 1916 to date inclusive are shown in Table B.

TABLE B. BUILDING OPERATIONS AT BRADEN

Type	Number Built	Under Construction	Average Cost Per House	Total Expenditure
Official houses	6	2	$12,164	$72,984
Type "A" houses	43	4	6,178	265,666
Type "B" houses	22	3	9,372	206,194
Type "C" houses	219	108	578	126,506
Type "D" houses	735	1,046	694	509,985
Staff quarters	9	3	22,582	203,239
Schools	2	2	13,638	27,276
Sewell hospital	1	....	299,538	299,538
Miscellaneous hospitals	3	1	7,056	21,168
Hotels	5	2	33,453	167,265
Miscellaneous	....	....	.....	325,180
Total				$2,225,000

SCHOOLS

At Braden the population is somewhat scattered and a number of small schools, conveniently situated, has proved the most practical solution. At Chuquicamata,

NATIVE SCHOOL AT CHUQUICAMATA

where the Americans and Chileans are collected in their respective villages, central schools for each have been erected. The number of American children of school age is comparatively small, and school facilities have been provided accordingly.

There are 888 Chilean school children enrolled on the property, and a modern school constructed of a wooden framework covered both on the exterior and interior with metal lathing and plaster has been erected. It consists of a front 280 ft. long, with wings at each end extending back 38 ft. at present, but designed for further extension where required. The present building contains four classrooms for boys and four for girls, with the necessary coat rooms and other modern facilities, including a central steam-heating system.

HOSPITALS

The hospital at Chuquicamata had its beginning in one building and has grown with the other features of the plant. At present it consists of six one-story buildings conveniently grouped, which contain an operating room, a dispensary, a sun porch and complete modern equipment, with ward space for seventy-five patients.

Braden is provided with emergency hospitals at isolated communities and a central hospital at Sewell. The latter consists of two stories and basement and contains a well-equipped operating room, dispensary, consultation room, a sun porch and ward accommodations for fifty patients. The building and equipment cost approximately $300,000.

CLUBS

No buildings especially for club purposes have been erected at Braden, the entertainments being held in the Sewell gymnasium or other suitable buildings.

A very handsome American Club has been erected at Chuquicamata at a cost of $128,000. This building contains a large reception hall, a ballroom with a stage at one end, billiard room, reading room, dining room and kitchen, a bowling alley and a swimming pool 20 by 50 ft.

POTABLE WATER SUPPLIES

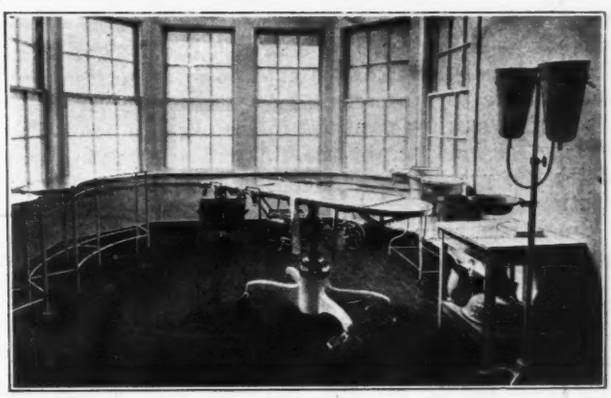
The general water supply at Braden is suitable for both domestic and industrial purposes, and all that has been necessary is to extend the distributing system and put in house connections as required.

At Chuquicamata the main water-supply system originally installed carries water in which the salt content is too large for drinking purposes, and for a number of years fresh water for domestic use was purchased from the Antofagasta & Bolivia R.R. Co.

The Chile Exploration Co. has now completed a fresh-water supply system consisting of intake works and a pipe line sixty miles long, which connects concrete storage reservoirs at Chuquicamata with the Toconce Springs, situated in the mountain range east of the property. The system delivers 800,000 gal. a day to the plant and cost $1,600,000.

On the Braden property the town-sites for the mine, mill, and smelter are now at Sewell. A new smelter and town are being erected at Caletones, and there are also towns for the company employees at Coya and Pangal. At Sewell the sewage is carried down the steep mountain slopes to the stream below in open or closed drains. At all other town-sites sanitary sewerage systems have been installed.

Chuquicamata is situated on a comparatively flat pampa and a complete sanitary sewerage system has been installed. The system has a modern treatment plant consisting of Imhoff tanks that are capable of treating the sewage for a population of 10,000. The collecting



SURGICAL OPERATING ROOM IN HOSPITAL, CHUQUICAMATA

system can dispose of the sewage from a population of 20,000 and arrangements have been made to install a duplicate Imhoff unit should it become necessary.

SUMMARY OF EXPENDITURES

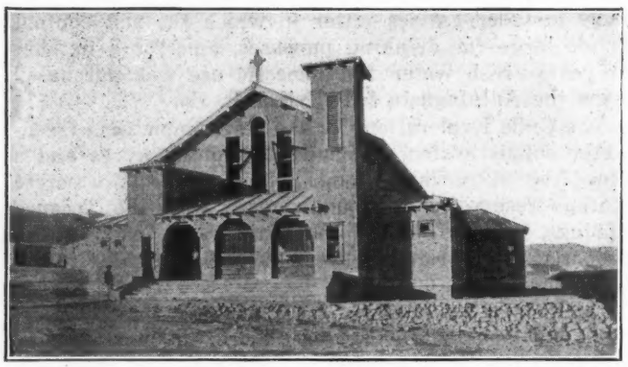
The total expenditures at the respective properties for welfare since 1915 have been as indicated below:

	Braden	Chuquicamata
Housing	$1,775,000	$1,475,000
Sanitation	125,000	1,214,000
Hospitals	321,000	34,000
Schools and churches	27,000	141,000
Stores	64,000	89,000
Amusements	17,000	166,000
Miscellaneous	50,000	17,000
Total	$2,379,000	$3,136,000
Additional housing authorized and under construction, but not completed	210,000	500,000
Grand total	$2,589,000	$3,636,000

The cost of operation or use of the so-called welfare facilities is from $400,000 to $500,000 U. S. currency per annum at each property. The following is a brief summary of the more important activities:

HOUSING

In the beginning, houses were supplied to all without charge. The first three types were entirely equipped with heavy pieces of furniture. At Braden, where hydro-electric power was cheap, these houses were



CATHOLIC CHURCH BUILT BY COMPANY

heated free of charge by electricity. The fourth type was partially furnished and the fifth type not at all.

Experience has shown objection to this system because of a tendency to abuse the free privileges. There was an ever-increasing difficulty in satisfying the employees in the allotment of the houses, and the single men objected that the married men should receive in the grant of a house so much greater real wage in addition to their money wage. At the Braden Copper Co. "staff" wages have now been increased to cover a charge for rent which is made for all staff houses. At the Chile Exploration Co. some of the objections to the free rent system have been overcome by a strict reservation of types of houses for positions in the organization. The problem, as indicated by the different systems in force at the two properties, has not yet reached its ultimate solution.

Single men were at first assigned a room and a house at which to board, but it has been found that greater contentment results from a variety of eating places from which to choose and from homes for small groups. The most popular development has been a special house to accommodate groups of from eight to sixteen men, each man having his own bedroom, with a common living room, dining room, and kitchen.

Complete statistics, which are used in the assignment of houses, are kept both of the proficiency in their occupation and suitability as tenants of the individual Chilean workmen. Prizes are offered to encourage cleanliness in Chilean workmen's homes and beauty in their garden plots.

SANITATION AND HOSPITAL SERVICE

The sanitation corps inspect the water, the sewerage systems and the houses of the employees constantly. Garbage is collected daily and is either buried in the tailings dumps or flushed off in open canals to the river.

The hospital service is equal to that of our best American hospitals. Doctors and nurses are both Chilean and American trained and are of the highest type obtainable. The service includes a limited control of the personal habits of the Chilean laborers, who are encouraged to bathe and wash their clothes, and are obliged to be free from parasitic insects. To assure this, appropriate bathing and washing plants have been erected.

The death rate of the community compares favorably with that of other parts of the world, except in the case of the Chilean children. Even in this case the death rate is very low in comparison with other communities in Chile. Much is being done toward the education of Chilean mothers through contact with the American and Chilean nurses who visit the Chilean families regularly as a part of their routine work.

There is probably no other section of the welfare department upon which the contentment of the community is so much dependent as the medical section. The importance of the personality and ability of the chief surgeon in communities of this kind cannot be overestimated. Both Dr. William F. Shaw, of the Chile Exploration Co., and Dr. R. W. Richardson, of the Braden Copper Co., not only have the absolute confidence of the staff employees and their families, but the Chilean laborers have a respect and admiration for them, both as medical advisors and as their friends, which is a powerful and beneficial influence at the respective properties.

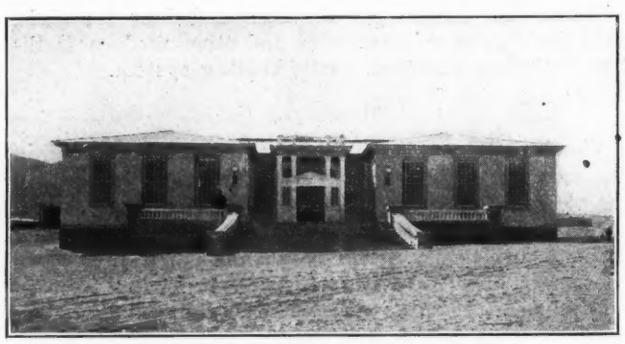
CHURCHES

At one of the properties a picturesque Catholic church has been erected. At both the properties Catholic and Protestant services are held in the schools.

EDUCATION

There are two school systems, one for the children of foreign employees, the other for the children of Chilean workmen. The school for foreign children begins with the kindergarten and ends with the grammar-school course. Courses in Spanish are available to the foreign employees and their families.

For the Chilean children, native teachers, who are selected with great care, are employed, and although the schools (owing to lack of available government funds) are operated partly at the expense of the respective companies, they are under government supervision. Attendance and interest in these schools are rapidly and constantly improving. The progress that the second generation is making, the outward sign of which is an extraordinary improvement in cleanliness and dress, is quite a remarkable indication of the success of the educational work.



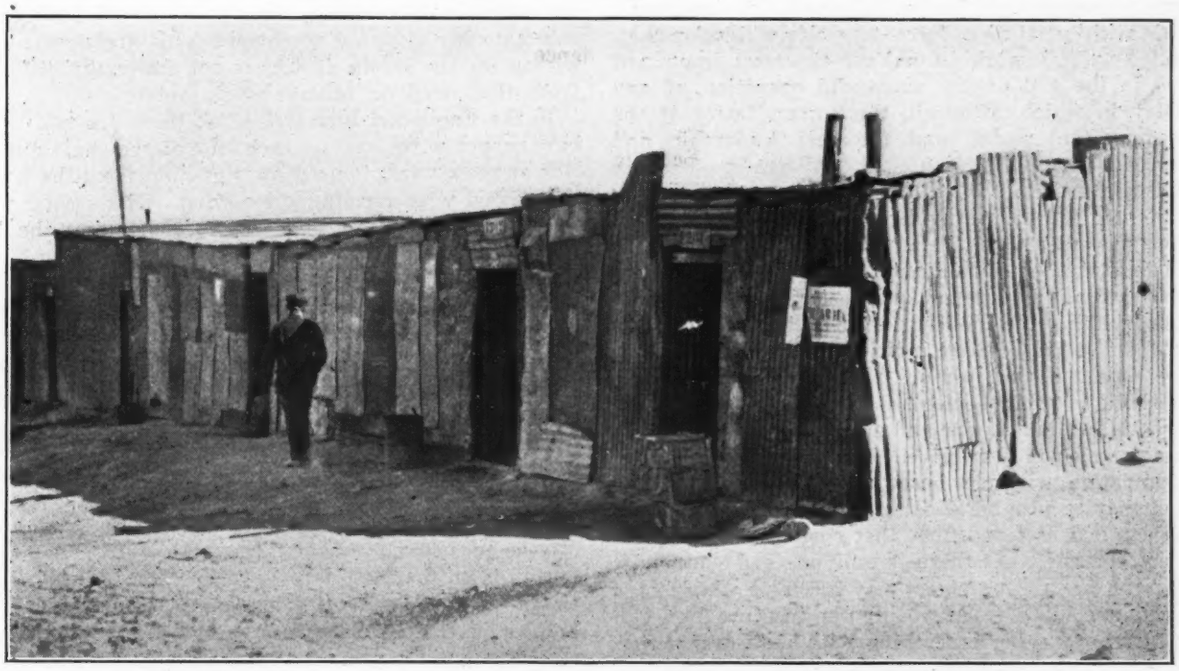
THE CHILEX CLUB AT CHUQUICAMATA

As auxiliary to the school system there have been organized brigades of boy scouts and a corps of girl scouts.

Night schools have been established to instruct the more ambitious Chilean workmen. The instruction in these schools begins with reading and writing and extends to mechanics and languages.

Amusements

It was early recognized that ample and varied diversion is necessary for the employees and their families if they are to be content. Clubs, moving pictures, festivals, bands, games, athletics, and horse races have been provided, and are kept going as actively as possible. They are an offset to the temptations of the various forms of vice which have appeared just outside the companies' properties, especially at Chuquicamata. In so far as it has been possible to do so the management of all clubs and amusements has been turned over to the employees. Wherever there has been the proper leadership in these individual undertakings they have become completely successful and in most cases self-supporting. A most unusual feature to be found in a mining camp is the Chilex Club at Chuquicamata. When one crosses its threshold on a dance night one feels that the ministering genius of the Andes has transported one from the desert to a gay ballroom in some big city of the United States or Europe.



NATIVE CHILEAN HOMES AT CHUQUICAMATA BEFORE IMPROVEMENTS BY AMERICANS

Stores and Markets

The companies operate stores and markets at both properties. Of all the human problems arising in the operation of these properties probably the store problem is the most vexatious and difficult. The companies provide and operate stores of necessity, either because no one else provides them in these isolated communities or else as a protection to the employees from profiteering by independent merchants. The stores at both properties have made heavy losses. It is the aim at both places to operate them without profit or loss.

A recent experiment in connection with the store at Chuquicamata is proving very successful. A committee of ladies, expert in household craft and economy, has been formed to both assist customers in purchasing and to give advice on household matters. The committee has a permanent representative in the employ of the company.

Policing

The police are of two kinds, watchmen and government rural police. The watchmen have no authority and serve little purpose other than to watch for trouble and report to headquarters. On the other hand, the government rural police were generally recruited from the ranks of ex-soldiers and are commanded by regular army officers, who have great authority and succeed in maintaining excellent discipline and order.

A national savings bank has been established at each one of the properties. Deposits of workmen are constantly increasing.

Safety-first work as it has been perfected in the most modern industrial works in the United States has been applied to the full extent in these two South American properties. Perhaps the only deviation from modern United States practice is the difference in the sense of humor between the United States safety-first cartoonist and his Chilean disciple.

The welfare problems at these two properties are made up of conditions that are perhaps unique, in a general subject that is as yet little understood, and from which little empiric information is available. Great strides have been made forward. The Chilean laborer, who five years ago lived in a hovel in filth, with all the mental degradation that is concomitant with such surroundings, today lives in a small but comfortable home, enjoying the fundamental facilities that modern hygiene affords. Instead of the ragged, barefooted, irresponsible laborer of five years ago, there is a well-dressed, well-shod workman with the spark of ambition burning within him. Great as has been the improvement with the men, it has been even more marked with the women and children. The latter, in

their school house, compare favorably in appearance with the children in the public schools of the United States.

With this social change the Chilean laborers have developed great intelligence and adaptability and have advanced rapidly in efficiency. They have been made expert miners, mechanics, smelter, and mill men, steam-shovel and locomotive operators, all through their work at these plants and through the social progress that they have made. Experience at these properties has taught that so-called welfare work is worth while, not only from the human but from the economic results to be achieved. These companies have now a skilled, permanent class of employees instead of the roving, unambitious class of laborers, from which they formerly had to draw.

An analysis of accomplishment evinces two factors that stand out as worthy of consideration in the work that has been done. The first is that the old saw, "What is everybody's business is nobody's business," applies with particular force to welfare development. So-called welfare work is perhaps the most important means to the end of the successful operation of any industry in which, after all, the human factor is the most important agent, and the best leadership and exceptional personality is needed to direct it. Because of this leadership, the staff employees, and more recently their wives, are evidencing a growing interest in the government of their mining cities and in the well-being of their inhabitants. It is the development of this community interest and the widespread feeling of responsibility for the less fortunate by the more fortunate that is the greatest indication of real progress.

The second is that welfare work needs more than a bank check to achieve success. The welfare movement is essentially a human one and unless it is approached in a human way will not thrive. Unless the work has for its foundation principles based upon the firm conviction that humanity progresses, that human progress means efficiency, and, last and first, that commerce is a means and not the end, that there is only one end—humanity—then the welfare movement may become a whirlpool of anarchy, and like a torrent behind an insecure dam may break loose, carrying everything with it to destruction.

Signaling Mine Hoists From Moving Cages

The problem of signaling to the hoisting engineer from a moving cage in the shaft has been considered by many mine operators, says C. A. Allen.[1] Several methods are in use, and it is believed that they have been further developed in Utah than in any other state. The latest installations are of interest because they use a very low-voltage circuit for the shaft wires and also because the wiring can be so arranged that the hoist can be stopped from the cage, if so desired.

The first installation in Utah was placed in the shaft of the Centennial-Eureka mine, and has been in continuous and satisfactory operation for twenty-one years. The arrangement consists of two bare wires in the shaft carrying a current at 60 volts potential, with a device on the cage for making connection between the two wires. This device is simply a short piece of wire which is thoroughly insulated from the cage and is operated by a short lever. Whenever the cage rider wishes to signal the engineer he pulls down the lever, forcing the short wire out against the two bare wires, thus making a circuit which rings the bell in the hoist room.

Later a similar system was placed in the shaft of the Eagle and Blue Bell mine, at Eureka, but dry batteries were substituted, reducing the voltage to about 10. This shaft is wet in places, but no trouble has been experienced. The hoist is a double-reel modern electric machine with oil-operated clutches and brakes. The clutch and brake for each reel are actuated by different movements of the same control lever. The hoist has the usual safety devices, such as limit switches in the headframe, position switches for each reel, and ball-governor control. These safety devices are operated by what may be termed the control wiring, which is in series with a no-voltage release on the switchboard. Should the circuit in the control wires be broken, the no-voltage release acts, which cuts off the power and automatically applies the brakes. For example, if the cage should be pulled up to the limit switches, the circuit would be broken, automatically stopping the hoist. This arrangement of wiring for the safety devices is not materially different from that used on other electric hoists.

In the Eagle and Blue Bell shaft there are two No. 4 bare copper wires, one on each side of the shaft guides. One of these wires is used for signaling from the levels, the second wire forming the return. The second wire is also used to make the circuit for ringing the bell from a moving cage.

As regards signaling from the cage, it may be assumed that there is only one bare wire in the shaft, this wire extending into the hoist room and through an ordinary Western Union relay switch to the ground. On the cage is a battery of six dry cells inclosed in a piece of iron pipe for protection. One terminal of the battery is connected to the hoisting cable and is thus grounded through the hoist. The other terminal is connected with an ordinary push-button switch and a piece of curved copper plate which, by means of a small lever, can be pushed out against the bare wire. The push button is on the same lever. When the cage rider pulls the lever, at the same time pressing the button, current flows from the dry cells through the bare wire, through the relay into the ground, thence through the hoist cable back to the cells. The current flowing through the relay closes a separate electrical circuit, which rings the signal bell. The current for the bell circuit is supplied by thirty dry cells in the hoist room, but connection could be made with a direct power or lighting circuit.

The important feature of this arrangement is that the dry cells, placed on the cage, give a low-voltage current, only ten or twelve volts, eliminating all possibility of danger, such as would be present were higher voltage used. Also, if the contact lever should be accidentally struck and contact made with the bare wire, the circuit would not be completed, because, to close it, the button must be pushed at the same time the lever is thrown. The use of the relay in the hoist room is also important, because it permits the use of a low-voltage current in the shaft and a higher voltage to ring the bell.

To stop the hoist from the cage by the same wiring system, it is only necessary to place in the control circuit of the hoist another relay so arranged that when the circuit is completed in the shaft this relay will *open* the hoist-control circuit. As soon as this circuit is open the no-voltage release on the hoist switchboard will be operated, cutting off the power and stopping the hoist.

[1] U. S. Bureau of Mines (Report of Investigations).

Books in Coal and Metal Mining Towns

A Real Need in Most Mining Communities for Libraries—American Library Association To Undertake an Enlarged Program in Providing Reading Rooms for Industrial And Mining Centers—Scope of the Work

BY T. S. DA PONTE
Written for *Engineering and Mining Journal*

A SPLENDID field for welfare work and for the promotion of better citizenship is to be found among the men who devote their lives to mining. This despite the fact that some mining communities are "model" places in which to live, having modern libraries and schools, as well as other advantages. An infinitely larger number of mining camps and towns, however, possess no such attributes.

PERIODICAL AND GENERAL READING ROOM OF THE COPPER QUEEN LIBRARY AT BISBEE, ARIZ.
Maintained by the Phelps Dodge Corporation not only for employees but for residents of the community, which includes five villages and surrounding farms. Books and magazines on trades and industries and special books on mining are provided.

It is to the last described communities that the American Library Association desires particularly to extend a helping hand by urging that libraries be installed which shall contain not only books that are American through and through, that tell of the greatness of this country and the advantages of living in it, but which also provide special and technical books from which employees can learn all the details of mining work and processes. In this way those engaged in the mining industry may acquire a broader outlook and become more efficient and capable of advancing in the work in which they are engaged.

An investigation by George S. Rice, chief mining engineer of the U. S. Bureau of Mines, at the request of the American Library Association, has shown a void in the lives of miners and mining engineers which can be filled only by the proper kind of books. As an example, a report from C. A. Herbert, district mining engineer, at Vincennes, Ind., says: "As far as I can recall, the only mining towns in the Central District that offer library facilities to miners are the mining towns of considerable size. I do not recall a single mining camp in this field where the mining companies maintain a library or reading room for the benefit of the miners. I am inclined to believe if efforts were made along this line that a number of the larger companies would be

very willing to furnish a small library, with the necessary reading room, for the benefit of their men."

J. J. Rutledge, mining engineer of the Bureau of Mines, at McAlester, Okla., sent me a letter saying: "In my judgment, library service is needed in Krebs, Carbon, Lehigh and Colgate, Pittsburgh, and Dow, Okla.; in Hartford, Huntington, and Russellville, Ark., and in Frontenac, Franklin, and Baxter Springs, Kan." However, Mr. Rutledge makes a more encouraging report from other localities, saying: "There is a very good city (Carnegie) library in McAlester, which is used, I believe, to some extent by members of miners' families living in McAlester. There is an excellent technical library in the mining town of Wilburton, Okla., where the Oklahoma School of Mines is situated. I have known of this library being consulted frequently by young engineers in search of technical information."

Writing from Golden, Col., D. Harrington, of the Bureau of Mines, says: "Mining camps in which libraries are needed are numerous, though it might be somewhat difficult in many places to establish a library, on account of the smallness of the camps." In the section in which Mr. Harrington is situated, however, he finds that "nearly all the larger mining localities have libraries, and in some of the smaller ones traveling libraries are found. Butte has a well-stocked public library, and at Miami, Ariz., the Y. M. C. A. has a library which is accessible to the miners." Mr. Harrington named Red Lodge, Mont.; Globe, Ariz., and Rock Springs and Sheridan, Wyo., as other districts in which libraries are accessible.

The report made by Carl A. Allen, chief mine inspector of the Department of Mine Inspection, Salt Lake, Utah, says, "In the metal mining districts there are libraries available at Bingham, Park City, and Eureka," and gives the following list of communities "which might be interested in obtaining library service: The Deer Trail mine, Marysville, Utah; the Mineral Product Corporation, Marysville, Utah; the South-Hecla, Alta, Utah; the Cardiff Mining & Milling Co., Sugar House Station, Salt Lake City, Utah; the Salt Lake Copper Co., Tecoma, Nev.; and the Vipont Silver Mining Co., Oakley, Idaho."

Mining communities are a particularly difficult field in which to instill the reading habit, because so many of the miners and their families are newcomers to the United States, and are without a knowledge of English. The American Library Association, however, purposes to surmount this obstacle by urging, as one feature of its enlarged program, the translation into foreign languages and publication of books which tell of American ideals and aims, so that our new citizens may come to know us better, and without the delay that would be inevitable if the information were not available until after the foreign-born worker had acquired a knowledge of English.

DELIVERY DESK IN REFERENCE ROOM OF COPPER QUEEN LIBRARY

Another feature, and one in which the Special Libraries Association is heartily co-operating, is encouraging the installation of special and technical libraries in industrial plants, merchandising establishments, banks, and in fact in all organizations where they will be found useful by both employers and employees. Also, the adoption of the county library system, which is designed to put books within easy reach of the people everywhere, is being strongly urged. The Association is continuing its service to the merchant marine, coast guards, light-

house stations, and men in the Public Health Service Hospitals, and is increasing its efforts to supply the blind with reading matter.

During the war the American Library Association did a great and helpful work in supplying more than 7,000,000 books to the men in service at home and overseas. General Leonard Wood has complimented the Association on its war service and has indorsed its enlarged program. In a letter he said: "I have read with interest the enlarged program of the American Library Association. During the war I followed the work of the Association closely, both at Camp Funston and in the Central Department. It performed invaluable service to our men, both as a means of recreation and education. I wish the Association the heartiest success."

P. P. Claxton, U. S. Commissioner of Education, has written: "I am greatly interested in the proposed plan for the enlargement of the activities of the American Library Association, and I wish for the Association the very fullest possible success in them all. . . . But I am most interested in the establishment of county libraries. Studies recently made by the Bureau of Education indicate that a very small portion of the people who live in the open country and in villages and small towns have access to any adequate collection of books. In more than two-thirds of all the counties of the United States there is no library with as many as five thousand volumes. It is, however, just these people of the small town, the village, and the open country who have most time for general reading and who would use good libraries to best advantage. I sincerely hope the American Library Association may be able to carry forward a plan which has long been dear to me: that of establishing public libraries in good buildings and with trained librarians in the county seats of all the counties, and then establishing branch libraries in the other towns and villages of the county, and using the public schools as distributing centers."

To carry on the work of the enlarged program, the Association, which has been in existence forty years, and which is composed of 4,000 librarians throughout the country, is now raising $2,000,000. This fund, however, will not be raised by an intensive campaign or drive, but will be obtained by library trustees, friends of libraries, and the librarians themselves.

The Potash Deposits of Alsace

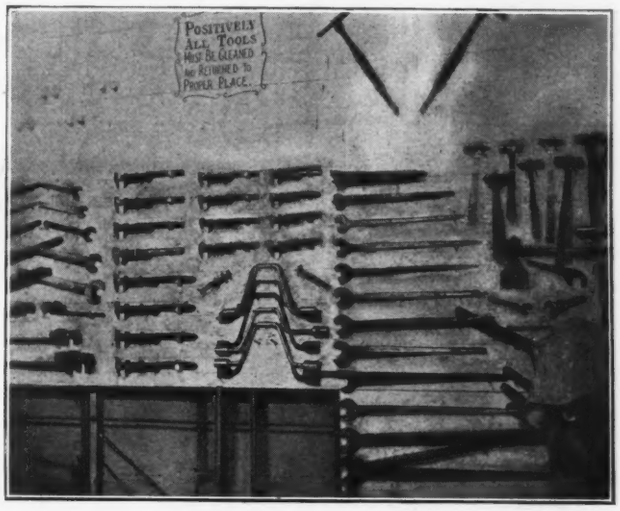
Potash salts were discovered in upper Alsace in 1904, in drilling for oil. Subsequent exploration and development, according to the U. S. Geological Survey, Department of the Interior, indicate that the deposits underlie an area of more than seventy square miles, and that the workable beds have a depth of about 2,000 ft. and range in thickness from 6 to 30 ft. The salts consist essentially of sylvinite, a mixture of sylvite and rock salt. Estimates place the quantity of potash salts in the deposit at 1,472,058,000 metric tons, which gives more than 300,000,000 tons of potash (K_2O).

The first mining shaft was completed in 1909 and production began in 1910. In 1913, a total of 40,707 tons of potash (K_2O) was produced from this source. The German Kali Syndicate, which controlled these mines as well as those at Stassfurt, determined the proportion of potash to be produced by the Alsatian mines at about 4 per cent of the total annual production from Germany. The main object in limiting the output was to prevent overproduction and thus a lowering of the price. When the Armistice was signed in November, 1918, the Alsatian mines were transferred to French control and apparently were in a very bad condition.

Tool Racks

Written for *Engineering and Mining Journal*

The problem of keeping track of tools in such a way as to permit of their being readily obtainable and quickly returned is one that every mine superintendent has had to face. The illustration shows how this troublesome detail is handled on the dredges of the Yuba Consolidated Goldfields Co.



TOOL RACK IN GOLD DREDGE

The number of tools in use on a dredge is large, and a tool board, such as the one shown, though not new in principle, effectively solves the problem. This tool board is placed on the main deck of the dredge on the starboard side and on the wall of the ladder-well close to the digging end of the dredge. Most of the tools too large to go in a rack are also kept at this place. Cleanliness, order, and the prompt return of tools are the invariable rule.

Molding Sands

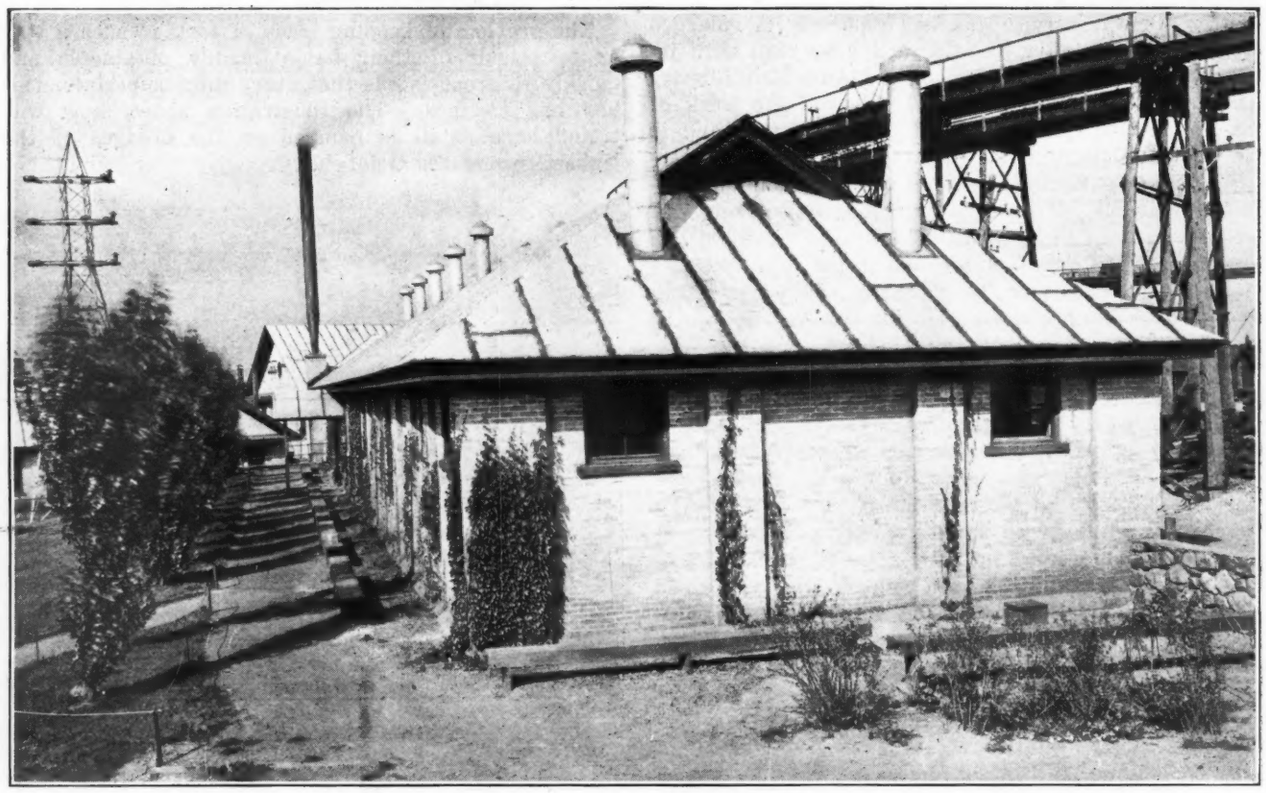
Steel-molding sand is a white or yellowish clean quartz sand high in silica. It has no bond, and in order to make a mold with it a small quantity of fire clay, molasses water, or other material is added for binder. The size of the sand grain varies with the work to be done, according to the U. S. Geological Survey.

Iron-molding sand or foundry sand is siliceous sandy material used in foundries for making molds and cores for casting molten iron. It is usually of some shade of brown, may be clayey, loamy, or sandy, fine or coarse grained, and has strong bond when moist. From 3,000,000 to 5,000,000 tons is used annually.

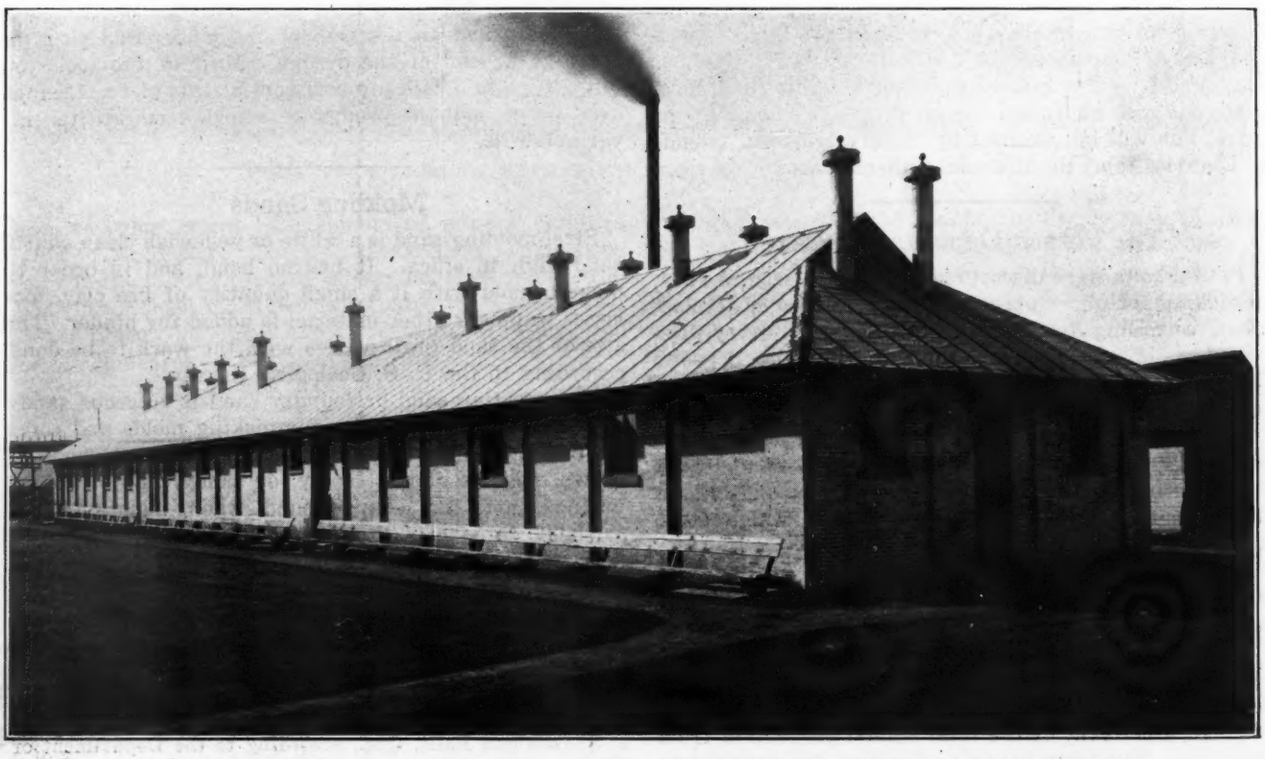
Brass-molding sand includes sand used for molding brass, bronze, and aluminum. This is a very fine-grained sand with strong bond which will take sharp detailed impressions.

The Manufacture in Canada of Metallic Magnesium has been undertaken by the Shawinigan Electro Metals Co., Ltd., at Shawinigan Falls, Que., according to the Department of Mines.

Change Houses in the Michigan Iron Country



DRY HOUSE AT THE MORRIS MINE OF THE CLEVELAND-CLIFFS IRON CO. NEAR ISHPEMING, MICH.



DRY HOUSE AT THE NEGAUNEE MINE OF THE CLEVELAND-CLIFFS IRON CO., NEGAUNEE, MICH.

Group Insurance Plan Popular

Meets Wide Application in Michigan Copper Country, First by the Calumet & Hecla, and Has Extended to Other Mining Districts—How It May Be Introduced, and The Approximate Cost to Employers

BY BALLARD DUNN*
Written for *Engineering and Mining Journal*

JAMES MACNAUGHTON, vice-president and general manager of the Calumet & Hecla Mining Co., has earned a reputation as a man of affairs. Like many American business executives who have been successful in a big way, there is an intensely human side to his character—in addition to being a practical business man, he is an apostle of practical humanity. The interests and welfare of the employees of those companies of which he has charge has always been the subject of his solicitude.

Workers in copper mines do not usually carry much life insurance, and the lack of it at the death of the bread-winner early attracted the attention of Mr. MacNaughton. He discovered that much misery commonly followed the death of one of the miners, and an investigation revealed the startling truth that about 20 per cent of his employees could not get life insurance if they desired it, because for one reason or another, they were not able to pass the necessary physical examination. He also found that approximately another 20 per cent could secure insurance if they wished, but had not provided for the contingency of death.

The result of these investigations was an arrangement with the Equitable Life Assurance Society for a policy of group life insurance, covering all employees in the Calumet & Hecla properties, an insurance policy amounting to nearly $10,000,000 and protecting the beneficiaries of between 9,000 and 10,000 employees.

Every employee who has served six months with the Calumet & Hecla Mining Co. is given an individual life insurance certificate for $1,000. At the end of the first year this certificate is increased to $1,100, and for every year of completed service thereafter an additional $100 is provided, until at the end of five years it has reached a total of $1,500. This maximum of insurance continues throughout the employee's services.

To make this arrangement, the entire number of employees was insured without medical examination and regardless of age, sex, or nationality. The premium for the entire program of insurance is paid by the Calumet & Hecla Mining Co.

Within a few days after the insurance went into effect, five deaths occurred among the older employees, upon which insurance benefits were promptly paid. This, in the language of Mr. MacNaughton, "did more toward making the insurance acceptable and appreciated by their employees than anything else could have done."

EMPLOYEES APPRECIATIVE

One of Mr. MacNaughton's friends, speaking about his attitude toward group life insurance and his interest in it, said:

"Mr. MacNaughton is very enthusiastic about the group plan, and says that he has received several letters of appreciation from his employees. He also states that this is very unusual, as in all his experience in the handling of men, and he has had considerable, he has never received appreciations of this kind."

The most interesting side of the entire group plan, however, is in its effect upon the problems of employment. Mr. MacNaughton, expressing himself upon this point, says:

"I feel very confident that in order to compete with us in the employment of men, the other mining companies in this district will eventually have to adopt this or a similar plan."

This prophecy has in a large measure been fulfilled. Most of the mines in the northern peninsula of Michigan have introduced a similar program of group life insurance, among them the Seneca and Gratiot mines of the Lewisohn interests, the Michigan Copper Mining Co., the Mohawk Mining Co., and the Wolverine Copper Mining Co.

In addition to these copper mines in Michigan, the program has been extended to the Tonopah district of Nevada, where the employees of the gold and silver mines of the Tonopah Mining Co. are thus protected, and to the Ontario nickel district, where the International Nickel Co. has adopted the plan.

GROUP INSURANCE WAS FIRST INTRODUCED TEN YEARS AGO

The Equitable introduced group insurance about ten years ago. It is based upon the principle that the selection necessary in securing proper employees furnishes the safety essential in all well-founded insurance programs. The business of issuing group insurance has grown rapidly, and today about one million industrial workers are protected by group life insurance, with a total insurance risk of nearly a billion dollars. It has been extended to such substantial concerns as the Union Pacific System, the Standard Oil Co., the DuPont companies, the American Sugar Refineries, the Skinner & Eddy Shipbuilding Corporation, the American Woolen Co., Montgomery Ward & Co., the General Electric Co., and the Thompson-Starrett Co.

The plan has been adopted by practically every character of business enterprise, from banks to foundries, and only recently the city of Albuquerque, N. M., has arranged for the insurance of all municipal employees, including the members of the fire and police departments and the teachers in the public schools.

The great mail-order house of Montgomery Ward & Co. was one of the first institutions in the country to cover its employees with this form of insurance. It has been in successful operation in that organization for nine years. Another organization which was a pioneer in group insurance is the Pantasote Leather Co., where the plan has also been in force for nine years.

*Equitable Life Assurance Society, 120 Broadway, New York.

Now for the practical side of the question: First, what is its cost, and, second, what is the basis of the plan upon which such a program can be introduced? I will consider the last of these propositions first, for the reason that the matter of cost, in a sense, depends upon the kind of plan adopted.

Broadly speaking, three general plans have been introduced and have been found effective: First, a flat sum for all employees, such as $1,000 or $1,500, to be paid to the beneficiary of deceased workers. Second, a sum predicated on the annual salary. Third, an amount graded according to length of service.

In all three programs a probationary or waiting period is usually provided before an employee becomes entitled to protection. This is for the purpose of making certain that the employee is really earnest in his desire to remain in employment. This waiting period varies from three months to one year, depending on the character of employment in the industry adopting the program. In both the plan based upon salary and the plan based upon service, a minimum is provided, as well as a maximum. The minimum has in many cases been set at $500, but, because of the increasing cost of living, the tendency is to make this minimum more nearly approach $1,000. Under the service plan, the usual program is to add to the minimum established, $100 for each year of completed service, until the maximum reaches the amount which has been set, which may be as high as $3,000.

A higher level of insurance is provided, if insurance be in the second form noted, for executives and department heads. A safe rule is to stipulate a level two and one-half times the level of the average of the general group. Here, too, there is a maximum of $5,000, but this higher maximum will be possible only in large groups. In fact, the maximum in all instances is regulated mainly by the total number of lives covered in the group.

Cost 1 to 1¼ Per Cent of the Annual Payroll

The cost of group insurance can be determined accurately only upon the statistics within the industry, the number of employees to be covered, the ages of these employees, and the amount of insurance at risk in each individual case. If the program is based upon length of service, this further fact must be taken into consideration, as it may involve increased amounts of insurance to those longer in service, who, in most instances, are also the older lives. It may be fairly stated, however, that the cost of a program of group insurance ranges from 1 to 1¼ per cent of the annual payroll. If the service program is adopted, the amount of insurance at risk is often less than the amount of the payroll, and in these instances, of course, the cost is predicated on a like percentage of the amount of insurance at risk. The cost will be somewhat reduced if the insurance is taken in companies issuing participating forms, as this program guarantees to each employer the benefit of any superior mortality which may be experienced in his industry as an outgrowth of improved working conditions.

The law provides that those to be covered under a program of group insurance must all be employees of one employer, and the number of employees to be covered in any one group may not be fewer than fifty. It is possible, however, to insure all of the employees in any one or more of the departments of a business, if these employees number at least fifty. It is also provided that in determining the amount of insurance, or the individuals to be entitled to it, the basis of selection must not rest upon the individual selection of the employees themselves or the employer. In other words, all employees in a given class must be covered, without regard to the individuals themselves.

Osmiridium Production in Tasmania

The mining of the rare mineral osmiridium in Tasmania is attracting widespread attention, and it is said that the island promises to be the world's chief producer for some time.

For months the Tasmanian Mines Department has been investigating the osmiridium fields of the west coast. The work includes a complete geological survey of the various fields in which osmiridium occurs, from Nineteen Mile Creek, in the north, to Wilson River, in the south; and the manner of the occurrence and distribution of this precious metal, which is now worth about £40 [$195 at normal exchange] per oz., has been carefully investigated. The publication of the complete bulletin is expected to throw much light on a highly interesting mineral occurrence.

It was not until 1910 that the Tasmanian Mines Department officially took notice of osmiridium among its mineral resources, and then efforts were made to ascertain values and outputs. These have since been carefully placed on record, thus enabling the state to enter the world's markets and attract attention to its new and promising source of mineral wealth.

The Department of Mines ascertained in 1910 that 120 oz. had been produced in that year, and by its assistance the output in the following year was more than doubled. In 1912 the output rose to 778 oz., and in 1913 it was 1,261 oz. This figure would have been far surpassed in 1914, it is stated, but for the war, and actually stood at 1,018 oz., despite the check the industry received. Under the influence of the war for the next three years the output was 247, 222, and 332 oz., respectively.

As osmiridium was a precious metal requisite for munitions of war, manufacturers, finding their usual sources of supply cut off, turned their attention to Tasmania. This resulted in keen buying, which sent the output up to 1,606 oz. in 1918. With the close of the war the rush collapsed, and for the first quarter of 1919 only 209 oz. was produced, but more stable conditions set in, and the production for the year reached the record total of 1,669½ oz.

The Tasmanian Mines Department recently published a highly interesting bulletin on osmiridium mining in Tasmania, prepared by Campbell Brown, who personally investigated the fields. According to this bulletin, the precious metal is found in various districts in the west of Tasmania, all of them more or less remote and somewhat distant from each other, yet bound together by a common invariable feature, namely, the occurrence in the neighborhood of great masses of serpentine rock. On the brow of Bald Head, in the Savage River district, facing Nineteen Mile Creek, there occurs an osmiridium mine which is unique. Here a well-known miner, according to the official bulletin, has been quarrying solid serpentine rock for over six years, and by crushing it obtained a high grade of metal. He is the first and only miner in the world, so it is officially noted, to find the precious metal actually occurring in the solid rock.

A Specialist in Human Engineering

Charles L. Close

SHAKESPEARE said, "The man that hath no music in himself, nor is not moved with concord of sweet sounds, is fit for treasons, stratagems, and spoils . . . Let no such man be trusted." The modern philosopher decrees that a man need not necessarily possess a fondness for music to merit the esteem of his associates, but he should at least acquire a hobby. And in this respect Charles L. Close is indeed fortunate, for he has two—fishing, and the study and administration of welfare work. Vacations are few in the life of a man as active as Mr. Close, but to one who is fortunate enough to listen to a recital of one of "Charlie's" fishing trips there remains little doubt as to the keen enjoyment which he obtains from his visits to the haunts of the finny tribe during his holidays. Certainly Izaak Walton never had a more ardent disciple. But thoroughness is characteristic of the man and his work, and so it is that C. L. Close is recognized today as one of the foremost figures in the development of safety, sanitation and welfare work in the iron and steel industry. Probably the first attempt at a concerted study of the human side of industry in this country was instituted in 1906 when the United States Steel Corporation initiated activities which resulted in the appointment of committees to investigate welfare matters. This action was followed by the appointment of a safety committee, comprising officials of the corporation and representatives of the larger subsidiary companies who had already given some study to the subject of accident prevention. Finally, in March, 1911, the Bureau of Safety, Sanitation, and Welfare was organized. This bureau carries on the administration work of the various committees dealing with these subjects. Although established primarily for the benefit of the corporation, the Bureau is constantly in touch with state and national authorities, other employers of labor, representatives of foreign countries, and many other individuals interested or actively engaged in this work. Such co-operation has been of great benefit not only to labor but to the operators as well.

CHARLES L. CLOSE

Space does not permit more than the most condensed statement concerning the accomplishment of the welfare movement as developed by the United States Steel Corporation. During the last eight years the company has spent over seventy-one million dollars in welfare, sanitation, accident prevention, relief, pensions and stock-subscription plans. That this expenditure has been justified is evident from the facts that the work is being continued and other companies have instituted similar organizations. The mining industry in particular has gained from the example set by the corporation in the splendid work of humanizing industry. The two metal-mining subsidiaries, the Oliver Iron Mining Co., operating in the Lake Superior region, and the Tennessee Coal, Iron & R.R. Co., in Alabama, in carrying out the general plan instituted by the Bureau, have set the safety standards now followed by several other mining companies, so that the industry today is free from many of the former hazardous conditions. Healthful and pleasant surroundings, better housing conditions, education, and Americanization have supplanted earlier ideas in regard to mining communities. Charles L. Close was born at Shelby, Ohio, in 1874, and at the age of nineteen entered the employ of the Shelby Steel Tube Co. Later he was transferred to the position of assistant superintendent of the company's plant at Greenville, Pa., following which he was made superintendent. In 1908, as safety inspector for the National Tube Co., he became an active figure in the safety movement, which was then beginning to receive attention in this country. Upon the formation of the Bureau of Safety, Sanitation, and Welfare by the United States Steel Corporation, Mr. Close was made manager, and he still remains in active charge of that work. It is through his efforts and those engaged with him that the conditions under which the employees of the iron and steel industry work and live today are superior to those in any other basic industry in this country or throughout the world.

Mr. Close's service to the mining industry is well illustrated by the interest in human engineering, some examples of which are detailed in this issue.

By The Way

"The Term Is Archaic"; Excuseitplease

The *Canadian Mining Journal* takes exception to our reference to "British American" nickel deposits. The editor says: "'British America' is correctly used to cover Canada, the British West Indies, British Guiana, and Honduras, from a geographical point of view, but applied to Canada today the term is archaic, if innocently used; and if deliberately chosen it is not well chosen."

On the Welfare of Bees

State bee experts of Arizona, well known, of course, like all experts, have found a very sickly condition to prevail among the bee colonies of the Verde Valley. This is attributed by the bee owners to the smelter smoke from Clarkdale and Clemenceau, the resulting mortality among the bees being so great as to be expressed in terms of hives instead of lives. Thus, perhaps, begins a new chapter in the smoke-nuisance history. It is said that, in consequence, chemists at the smelters referred to are running around taking samples of air about the plants, though there is nothing new about this practice. Perhaps the bee experts can breed a bee that will thrive on SO_2 and even give a sulphuretted honey. Springtime users of sulphur and molasses may be glad to make a change. This is a better course for the bee owners to pursue than that of suing the smelters, which policy has been followed somewhat to extremes.

Oil Behind Donnelly's Store

The *Kennebec Journal* reports oil on the water behind Donnelly's store in a town up river from Augusta. "Much interest," it says, "is being shown in the mysterious finding of some form of oil along the river banks and in the water behind the Donnelly store and above there for some distance. During the week," it adds, "a chemist has worked on it but has found no solution. The further it is investigated the greater seems the mystery." Truly, here is a subject for a dime thriller. "The Donnelly Store Mystery or Who Upset the Oil Can?" We are not experts on Kennebec oil, but our guess is that, year in and year out, they will get more ice than kerosene back of Donnelly's store.

Yo Tambien

A little knowledge of foreign languages is often of advantage, but there are times when silence ranks second best to absence. In the old days, before New Mexico attained statehood, a garrulous follower of mining became stranded in the Red River camp, in Taos County. This genius tried his hand at everything, from soliciting trade for an expiring assay office to acting as capper for a clique of poker sharps, careful always to seek what promised the minimum of actual physical labor. As the county election approached, there seemed a faint chance of getting nominated for sheriff. One of his own party in camp advised him to get solid with the Mexican element; coached him for two days in common phrases of salutation, and together they set out to contribute their society and a gallon of fire-water at a *junta* over in Taos. Arriving at nightfall, they tied their mounts and approached a large adobe building where waving pine-knots indicated that several Mexicans were conversing about something important. To each shrug and muttered curse, Barkis responded with bobbing courtesy and a cheerful "*bwanus tardus, ahmeego,*" or "*salood, hairmanno*"; while his escort made a slower but more diplomatic progress with the jug. With a growing feeling of importance, Barkis crowded his way toward the platform, where a grimy and impassioned orator was reaching the climax of a denunciation of all *gringos*. Finally the speaker cast down his mantle, tore open his shirt, suddenly flashed a long knife from some place of concealment and vehemently pounded his chest as he declaimed, "*Si tuviera yo el conocimiento que aun una pequeñissima gota de sangre gringo atravesaba este humilde corazón, con este puñal me abro el pecho para arrancar de mi cuerpo tal mancha vergonzosa*.*" The silence of the ensuing dramatic pause was broken by the prospective candidate, who pounded his own chest as he reverberated "*Yo tambien†!*"

Dangerous Ignorance

A fire boss at some Eastern mine recently asked for information regarding the nature of explosives, temperature of detonation, and the like. The desire to inform himself is praiseworthy in the man. But it seems as if he ought to have known some of these things before he got the job. How many fire bosses are there underground in our coal and metal mines who are similarly ignorant?

Local Color

The *Press Bulletin* of the U. S. Geological Survey is a staid sheet that deals with statistics and gives advanced digests of geological reports and activities of the Survey. One does not look for high lights except in figures, and something more than a liberal education is needed to appreciate such high lights when they do occur. Probably one of the least promising in this way of interest is the description of a topographical map. We must confess that we would find it difficult were we put to the task of describing one. But not so with a recent description of a new Government map of an area in southwestern New Mexico. The writer of this description is indeed one who is not held down by the four walls of a government office in Washington, as the following short quotation will show:

> It is typical of the desert region of the Southwest, where the flats are very flat and the mountains are very steep; where all the year's rain comes down at once in a torrential flood; where, for more than ten months of the year, few clouds fleck the copper dome of the sky; where the intense glare of the afternoon sunlight gives way to a rich golden sunset, which is in turn followed by a soft, purple twilight. Here the summers are long and the days are hot, but the nights are invariably cool. No trees grow here except the hardy mesquite—which produces more wood for fuel from its roots than from its trunk and branches—and a stunted juniper, which is found in the hills. Turbulent creeks come tumbling out of the Tres Hermanas Mountains, in the western part of the quadrangle, but on reaching the level lands, overcome by the heat, they vanish into thin air or crawl underground.

Cochise County, Ariz., was named for the famous chief of the Chiricahua Apaches, according to H. H. Bancroft. But wherefore "Cherry cow" for "Chiricahua"?

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*If I knew that even the least drop of gringo blood coursed through this humble heart, with this dagger would I open my breast, to tear such a disgrace from my body.

†So would I.

CONSULTATION

Resources and Commercial Application of Iceland Spar

"Several ledges containing Iceland spar have been discovered recently in the Warner range of mountains in Modoc County, Cal. These ledges are not made up entirely of the Iceland spar but are a mass of calcite crystals in which the Iceland spar occurs in kidneys.

"A portion of the spar in one of these kidneys may be perfectly transparent and show marked double refraction while another part of the same crystal will be cloudy. I will appreciate any information as to how this stuff is mined, where the crystals large enough for lenses can be sold and also where the smaller fragments of clear material can be disposed of.

"My information is that there is only one other deposit of this stuff in the U. S. and that is in Montana. Can you tell me whether or not this is being mined at this time and just where it is located?"

Iceland spar is a variety of calcite, clear and transparent and unusually free from imperfections and impurities. Transparent crystals or cleavage pieces of calcite of any appreciable size are very rare, and as Iceland has furnished almost all of such material used, the name Iceland spar has been given it. Optical uses consume the highest grade of Iceland spar.

Elongated cleavage rhombohedrons of Iceland spar are used in the manufacture of nicol prisms, which are an essential part of optical instruments requiring plane polarized light, as, for example, certain microscopes, dichroscopes, and saccharimeters. The material, on account of its simple chemical composition and purity, finds application in chemical standardization. Iceland spar is also used in the manufacture of some kinds of glass, and some of it is sold as mineral specimens.

Pieces of Iceland spar, according to the U. S. Geological Survey, either in single untwinned crystals, or parts of such crystals, or in homogeneous untwinned cleavage rhombohedra, which are large enough to yield a rectangular prism at least 1 inch long and half an inch thick each way and which possess the properties described below, are suitable for optical purposes. The colorless material must be so clear and transparent that it is limpid and pellucid. It must not be partly opaque on account of numerous cracks or fractures, must not show any internal, iridescent, or rainbow colors due to incipient cracks along fracture lines, nor any cleavage, nor twinning planes. Neither can there by any capillary or larger tubelike cavities, nor cavities or bubbles of any shape, nor inclusions, as isolated particles, veins, or clouds, composed of minute crystals of some other mineral or of any kind of foreign substance. The spar should not be discolored or stained by the presence of any clay, iron oxide, or other material. It should be noted that many of the inclusions and imperfections of Iceland spar are not always scattered irregularly through the mineral or even segregated in distinct masses, but frequently lie in a distinct but very thin plane which can hardly be seen if looked at on edge. In examining a piece of Iceland spar for defects the piece should therefore be turned in all directions while held to the light.

The material suitable for optical uses naturally brings the highest prices, as it has to be at least of the dimensions already given. Specimen material is generally of a larger size. The material used for standardization, chiefly chemical, need be of no special size, and the smaller pieces are as usable as the larger ones.

The optical variety of Iceland spar produced in the United States, sold, per pound, for $3 to $4 in 1914, about $8 in 1915, as high as $20 in July, 1918, and in 1919, according to the U. S. Geological Survey, was worth $15 per pound. The specimen variety sells for considerably less, and material for standardization sells for from $1 to $2 a pound.

The following firms are buyers of Iceland spar suitable for optical use: Bausch & Lomb Optical Co., Purchasing Department, Rochester, N. Y.; Central Scientific Co., 460 Ohio Street, East Chicago, Ill.; Gilbert S. Dey, Superintendent Optical Department, Eastman Kodak Co., Rochester, N. Y.

The market for specimen spar is irregular, as the demand is usually very light. The best market will probably be found with some of the larger mineral dealers.

Standardization material may be sold to large dealers in general chemicals as well as to mineral dealers.

Although calcite is, next to quartz, the commonest mineral, the only locality outside of Iceland known to produce the variety Iceland spar in commercial quantity is in Montana, about 9 miles from Greycliff, Sweet Grass County, on the main line of the Northern Pacific Railway. The spar occurs in a nearly vertical fissure vein from 3 to 8 feet thick, which strikes northwest, traversing a gneissic rock for several miles, and has been produced by Dr. J. P. Rowe, Hissoula, Mont., and R. H. Cartwright, Greycliff, Mont.

Uses of Feldspar

"Will you kindly tell me if there are any other uses for feldspar than for ceramic purposes? What does the demand depend upon?"

Although most of the high-grade feldspar is used in the manufacture of pottery or the ceramic industry it also finds application as an abrasive in the manufacture of scouring soaps and window wash. A special use of exceptionally fine quality feldspar is used in the manufacture of artificial teeth. The cheaper and inferior grades of the material find use as a binder in the manufacture of emery and corundum wheels, in roofing material and concrete work and in the manufacture of glass.

The demand for feldspar is almost directly dependent upon the ceramic industry and hence closely follows the prosperity of that industry. During the latter part of the war the demand for pottery experienced a sharp decline because of the non-essential character of the pottery industry. With the return to peace, however, the consumption of feldspar will very likely increase, continuing the trend exhibited in the pre-war years from 1908 to 1914. Present prices for both crude and ground feldspar are higher than in 1917 of 1918.

THE PETROLEUM INDUSTRY

The Economic Importance of Oil Shales

BY MARTIN J. GAVIN*

It is the opinion of many that the oil shales of Utah, Colorado, Wyoming, and Nevada, and possibly other states, are extremely important as new sources of petroleum products similar to those now obtained from oil-well petroleum. Oil shales have been worked in Scotland and France for upwards of sixty years. In the former country the industry has been a successful one from a financial standpoint, especially of late years, although it is passing through a difficult period at present. The industry in France has not been nearly so successful as that in Scotland. The success of the Scotch shale industry has been partly brought about by the development of cheap processes for treating the shales and the oils produced from them, but mostly by local conditions, such as competition only with high-priced petroleum products, low labor costs, and the fact that the industry grew up in a densely populated region where a ready market for oil and ammonium products was available. A recent reorganization of the Scotch shale companies, combining them into one organization, is hoped to better the present condition of the industry in Scotland.

Oil shale contains little or no oil as such, but it contains substances which when the shale is subjected to destructive distillation yield gas, crude oil, and nitrogen-containing compounds, notably ammonia, as well as other products in small and probably of unimportant value for the most part. Oil shale as a rule must be mined much as coal is mined, crushed, and heated to a relatively high temperature in closed retorts which may operate continuously or intermittently. These steps are necessary to produce the gas, crude oil, and ammonia, the latter of which is in solution in the water obtained along with the oil.

The ammonia water is then distilled and the released ammonia passed into sulphuric acid, producing ammonium sulphate. The crude oil must be refined, much as petroleum is refined, to produce the various commercial products. The refining of shale oil is more complex and in all probability more costly than the equivalent refining of petroleum. However, undoubtedly the shale oils can be refined and can be made to yield many products similar to those produced when petroleum is refined. The oils produced from the oil shales of this country will yield gasoline, burning oils, and paraffin wax, all of which when properly treated will undoubtedly be satisfactory commercial products. Whether the more viscous grades of lubricating oils, such as lubricants for internal-combustion motors, can be produced from shale oils is doubtful, but it may be possible to do so.

Our immense oil-shale deposits practically assure us that, come what may, this country will still have its own sources of petroleum products. We should never have to be wholly dependent on foreign countries in this respect. From another standpoint the shales are also of great economic importance. The oil shales, especially of the Rocky Mountain country, occur in sparsely settled regions. Their development on a large scale means the bringing into these regions of a great number of miners and other laborers, often with their families, who will earn their living in the shale fields and spend their money in the same locality. Millions of dollars must be spent in erecting plants, developing mines and the like, much of which will be spent in the states where the oil shales occur. The shale-oil refineries will require sulphuric acid and other chemicals and supplies, which logically will be produced as near to the shale fields as possible, thus bringing in more capital and labor. Transportation facilities will be extended to meet the requirements of the shale operators, thus benefiting the regions now inadequately supplied in this regard. Prices of petroleum products in the regions contiguous to the shale operations can be expected to be relatively lower than they would be if similar petroleum products had to be shipped in.

It should again be emphasized, however, that development of an oil-shale industry to a scale sufficient to be of so much economic importance will require much study, time, and money. The oil-shale industry is no business for the man of little experience and small capital. It may be compared with the development of the low-grade copper ores of the West, in that it is a large, low-grade, chemical manufacturing enterprise, requiring capital, time, and trained men. The investor in oil-shale operations should know that he will probably have to wait for a long time for a return on his investment and that returns in all probability will be conservative. In spite of this, the day of the oil-shale industry is coming. When, it is difficult to predict, but some day it will undoubtedly be one of great importance.

*U. S. Bureau of Mines, Reports of Investigations.

Shipping Board Bids Meet With Slight Response

WASHINGTON CORRESPONDENCE

The outstanding feature of the oil situation as it pertains to the Shipping Board, as described by the recent bids, is that practically no bids were received from the older and well-established companies. With requirements of 30,000,000 bbl. per year on the Atlantic Coast and European ports, only one bid, that of the Mexican Petroleum Co. for 4,465,000 bbl., is considered to be satisfactory. No announcement of the attitude of the board has been made, but it is believed that some action must be taken by the board itself to control its own sources of supply. The needs of the Pacific Coast have been cared for through a contract with the Department of the Interior for the purchase of oil obtained as royalties under the oil lands leasing bill. Most of the bids contained stipulations for the loan of funds by the board for the construction of terminal and pipeline facilities and for the development of oil fields.

NEWS FROM THE OIL FIELDS

Welfare Plan Prevents Strike at Bayonne Plant

Demands of Men for Higher Wages to Await Return of Department Manager

An excellent example of the appreciation of welfare work by employees was furnished on July 28 at the Bayonne plant of the Standard Oil Co. of New Jersey, when the men declared themselves as unwilling to strike during the absence of W. B. Koehler, general manager, who put in the welfare department and is now on his vacation. Twenty pilers employed in the case and can department quit work after making a demand for more pay. Several hundred laborers at the plant stated that they were dissatisfied with their wages.

The demand of the pilers for more pay will be presented to the officers of the company in New York by Superintendent Thomas R. Parker.

It is expected other workers in the Constable Hook plant will present a request for increased pay to Mr. Koehler upon his return. The welfare plan, instituted at the time Mr. Koehler took charge for the company, provided that the men should appoint representatives to treat with the company on all matters involving welfare or wages.

The welfare department is said to have been popular with the employees, and has been responsible for the formation of a band, baseball, and other athletic teams and many entertainments.

Rising Star District Proved

New Well Places Field Fourth in List of Eastland County Producers

From Our Special Correspondent

The Hilburn No. 2 well, in the Rising Star district of Eastland County, Tex., is reported by the Humble Pipe Line Co. to be making a good flow of oil from 3,100 ft. after having been shot. This is the second producing well in the district and proves the fourth oil field in the county. Hilburn No. 1 well, the first producer, was completed some time ago, and is one-half mile to the north of No. 2 well. The other fields in the country are the Ranger, Desdemona, and Pleasant Grove, brought in the order named. In the latter field, the Texas Co. reported two completions recently on its Littleton lease, making 500 and 200 bbl. of oil respectively.

Oil-field workers' unions are being organized in Texas by delegates of the Oil Field, Gas Well and Refinery Workers' Union of America. Local unions have been organized at Wichita Falls, Burkburnett, and Bridgetown, and an attempt is being made to induce all oil field and refinery workmen to join. No statements have been made yet as to the changes the union will demand.

Anglo-French Oil Agreement Announced

Co-operation between Great Britain and France with respect to Anglo-French oil interests in Rumania, Asia Minor, Russia, Galicia, and the French and British colonies is provided in an agreement the text of which recently has been made public by Parliament. The agreement provides for an equal division of interests in Rumania and for an equal share in the capitalization, management, and exploitation of such interests. In Mesopotamia France will receive, upon development, 25 per cent of the net output of crude oil at current prices; Great Britain agrees to support France in getting 25 per cent of the Anglo-Persian Co.'s oil piped from Persia to the Mediterranean through territory under French mandate. In consideration thereof, France agrees to the desire to construct two special pipe lines and adjunctive railways for the transport of oil from Mesopotamia and Persia through French spheres of influence to the Eastern Mediterranean. France generally renounces royalties and export and transit dues on such oil.

Boundary Disputes To Be Surveyed by Airplane

From Our Washington Correspondent

Twelve square miles and $200,000 worth of oil afford the basis for a dispute between the states of Texas and Oklahoma which will result in original proceedings before the U. S. Supreme Court during the December term. The territory along the Red River for several hundred miles eastward from the 100th Meridian to Texarkana is affected by the vagaries of this stream, which fluctuates from season to season. Twelve counties of Texas are thus uncertain as to just where their northern border lies. However, the present suit affects only twelve square miles where the oil rights are of such great value as to make the difference between the two states of serious consequence.

The preliminary engineering and mapping work which has been necessitated by this dispute is being arranged for by Arthur A. Stiles, State Reclamation Engineer of Texas. Mr. Stiles has been in Washington for about two weeks engaged in the necessary conferences looking to co-operation with the U. S. Geological Survey, U. S. Land Office, and the Air Service of the Army. It is anticipated that mapping by airplane under the latter service, together with topographic and land surveying work of the former two, will all be required by the Attorney General of the state, who is in direct charge of the suit.

Arkansas Proved as Oil Producer

Important Transfer Covering Large Acreage in Ouachita County Completed — Development in Other Counties

From Our Special Correspondent

The bringing in of the Hunter well in Sec. 13-15-19, Ouachita County, has proved the existence of commercial oil in Arkansas. Late in April the well had a show of oil at 2,121 ft. Immediately the Standard Oil Co. of Louisiana and the Louisiana Oil and Refining Co. jointly purchased this property, and operations were suspended, pending the perfecting of the title to the land on which the well was situated. The leases transferred by S. S. Hunter, the owner of the well, to the companies covered 21,410 acres in Ouachita, Union, and Columbia counties, for which the consideration was as follows: $850,000 cash; $1,000,000 to be paid for one-quarter of the first $4,000,000 saved and sold from the wells drilled on the properties, and an additional consideration of one-twenty-fourth of all the oil produced after the deduction of the one-eighth royalty. After the companies resumed operations about July 5, they decided not to drill further, as the mechanical condition of the hole was uncertain. The well was bailed and swabbed, and it was decided to put it on the pump, estimating that it would produce between 150 and 200 bbl. of oil daily of 38 deg. oil.

In Cleveland County materials are on the ground for a well near New Edinburgh, and a rig is in place for a well near Rison. The Arkansas Natural Gas Co. is going to drill near Hampton, Bradley County. Drilling is to be started near McGhee, Desha County, by the Shaffer Co.

Probably the next production in Arkansas will be the Humphries Petroleum Corporation well No. 1 in Sec. 23-12-19, Ouachita County. The present depth of this well is 2,940 ft. and it is being drilled in with standard tools. It is expected that the oil sand will be picked up at about 3,100 ft., this depth being correlative with the depth of the Straughan and Crawford well No. 2, in Sec. 15-12-18. The latter well is now about 3,100 ft. and is in the productive oil sands.

June production of 273,069 bbl. per day, as reported by the Standard Oil Co. of California, shows a decrease of 5,254 bbl. daily as compared with May. June shipments were 313,769 bbl. per day, an increase of 18,660 bbl. daily as compared with May. Stocks were decreased 1,220,994 bbl. during the month. Thirty-six new wells were completed during June, with an initial daily production of 6,455 bbl.

ECHOES FROM THE FRATERNITY

SOCIETIES, ADDRESSES, AND REPORTS

Efficiency of Mine Labor from the Surgeon's View

Dr. Murray of the Bureau of Mines Lays Down Some Pertinent Principles

In a recent bulletin of the United States Bureau of Mines,* Dr. Arthur L. Murray points out very pertinently that the inefficiency of mine labor is often not the fault of the men but of external circumstances, some of which the employer can improve.

"During recent months," he says, "much criticism as to the efficiency of mine labor has been heard from various sections of the country. No doubt much of this criticism has been well founded. The present lack of efficiency and of stability is due primarily to a spirit of restlessness and partial irresponsibility engendered during the transition from war conditions to peacetime conditions.

"Besides this important element of war restlessness there are others which the intelligent employer must pay attention to. First, if they are to get satisfaction from men they must select them intelligently for the work which is to be done.

"In the selection of men the two main considerations are physical ability and adaptability. The laws of mechanics should be applied in the selection of men as in the selection of machinery. If a machine is required for a certain class of work, the type of machine known to be mechanically fit for such work is selected. Likewise, men should be selected with regard to their physical and temperamental fitness for the kind of work expected of them.

"So far as possible men should be selected for their stability. Frequent labor turn-over is costly in many ways. The cost of breaking new men in, the disrupting of mine crews, the increased office work of opening and closing accounts, to say nothing of the effect on morale, can be measured in dollars and cents."

Also, once the employee is selected and on the job, all previous precautions are useless unless he is handled right. Dr. Murray's remarks on this score are not new, but they will bear an endless amount of repetition.

"The successful and continuous operation of a mine is just as much dependent upon proper supervision of its manual labor as upon its mechanical equipment and technical supervision. Supervision of mine labor, if the desire is to build up an intelligent and efficient force, must be firm but sympathetic and understanding. The old type of boss characterized by his ability to drive men rather than direct and lead them is passing. Today we look more to intelligent leadership, technical training, and sympathetic understanding as attributes of successful supervisors of labor. Generally, workers will exert greater effort and accept direction from a man they respect and admire more readily than from a man whose chief claim to a superior position is his driving power."

Naturally, the physiological safeguards which must be provided for the employee, as well as the psychologic content, are present in the minds of the surgeon in full force. Dr. Murray observes on this score:

"Industrial medicine is one of the most potent means of promoting labor efficiency and has application to every branch of mining operations. In the selection and planning of camp sites, the sanitary engineer is indispensable in determining adequate water supplies; methods of drainage, including proper sewage disposal; suitable housing arrangements as regards light, ventilation and overcrowding; and provisions for the disposal of refuse and waste. Through medical welfare work, especially by popular instruction in personal and public hygiene, much sickness with its resultant suffering and time loss may be prevented. The average loss of time due to illness among the workers of the United States is nine days per year, or 900 days per 100 employees (about 2½ years). The greater part of this illness, with its time loss, is due to preventable causes."

This medical care, he points out should be prompt to be efficient.

"The medical and surgical care for workers should be as good as can be provided. The time loss from disabling sickness and injury can be materially lessened by prompt and efficient medical attention.

"This leads to the question, not only of remedial medicines, but of disease preventatives.

"Drinking fountains and sanitary latrines underground are recognized necessities of large mining operations and add much to the comfort and health of the men. The general care of underground workings in respect to keeping them clean and free from débris has a marked effect on the men. The sight of débris in passageways, drifts and tunnels encourages shiftlessness and carelessness."

Next to actual illness prevention, comes the necessity of keeping men not only up and about, but fit.

"As a man lives so is he liable to work. The living conditions at any mine largely determine the type of labor that seeks employment and remains at that mine. A camp where housing conditions are poor, where sanitary conditions are below standard, where the general morale has been permitted to become lax, does not attract the best element.

"Not only is good food and good sleep necessary, but a man must have relaxation and that of a healthy kind.

"Approximately one-third of a man's time is employed at his labor. Another third is usually given over to sleep. The remaining third a man seeks diversion through recreation. This spare time through environment may be influenced for good or for evil. Every mining camp, if it desires to progress, must recognize that wholesome and health-building facilities for recreation are a necessity."

*Monthly Reports of Investigations.

Human Engineering by New Cornelia Company at Ajo

Modern Town and Dividend-paying Co-operative Store in Arizona Desert

The booklet description of the plant of the New Cornelia Copper Company at Ajo, Ariz., describes not only the mine and the reduction plant, but the human engineering works whereby the desert was made habitable for the employees.

The report states:

"To accommodate the employees of the New Cornelia Copper Co. and their families a new town was built. This town is located on the edge of the desert, within convenient reach of the mine and the plant. The attractive mission architecture preserves the traditions of the Spanish fathers whose hardihood made possible the development of the desert."

The artistic designing of this unusual mining town is shown in the accompanying illustration.

The life of the town, according to the report, "centers about a plaza, 360 by 200 feet in size, with bandstand, walks, trees and spacious lawns. On summer evenings dances are held on the broad concrete walks, and the shady lawns are the favorite meeting places for the citizens.

"On the east side of the Plaza is the railroad station. The large co-operative store, bank, restaurant and other business and amusement places occupy the modern business block, behind its broad arcades. Around the Plaza are grouped the attractive tile or frame dwellings of the American employees, and the new school building. A complete water, lighting and sewer system was installed before the town site was occupied."

The Mexican employees have their own town.

"Over the hill toward the mine is the Mexican town site, with its one-,

two- and six-family hollow tile houses, all harmonizing with the general architectural plan. The Mexicans have taken great pride in their clean and attractive homes."

The hospital is a substantial modern building of the best type.

"On a hilltop overlooking the desert is located the hospital. This has been the particular pride of the New Cornelia management. There are beds for thirty-five patients, and all the equipment is of the most modern type. Based on their earnings, employees are charged $2.00 and $1.50 per month for medical and hospital service for themselves and families. For this fee they receive all necessary treatment, including operations, hospital care and medical visits."

The problem of supplying food and other necessities to employees at a reasonable price, and frustrating the profiteering of the small merchants who so often infest a mining camp, was met by a co-operative store financed by the company.

Since there were no adequate stores at Ajo, the New Cornelia Co-operative Mercantile Co. was organized to sell merchandise to the employees of the New Cornelia Copper Co. and allied companies. The New Cornelia Copper Co. advanced money to erect the store and buy the stock, and assumes all risks. The store is managed by a store manager appointed by the New Cornelia company. A committee of seven workmen, representing the various departments, meet with the store manager once a month, making suggestions for the betterment of service, and presenting complaints which have been brought to their attention.

"The store carries a large and well-assorted stock. Prices are at the same level as in other Southwestern mining camps. At the end of each year, after deducting for depreciation on store equipment and fixtures, and a proper sum for surplus account, the rest of the profits are divided among the employees of the company in proportion to the amount of their purchases.

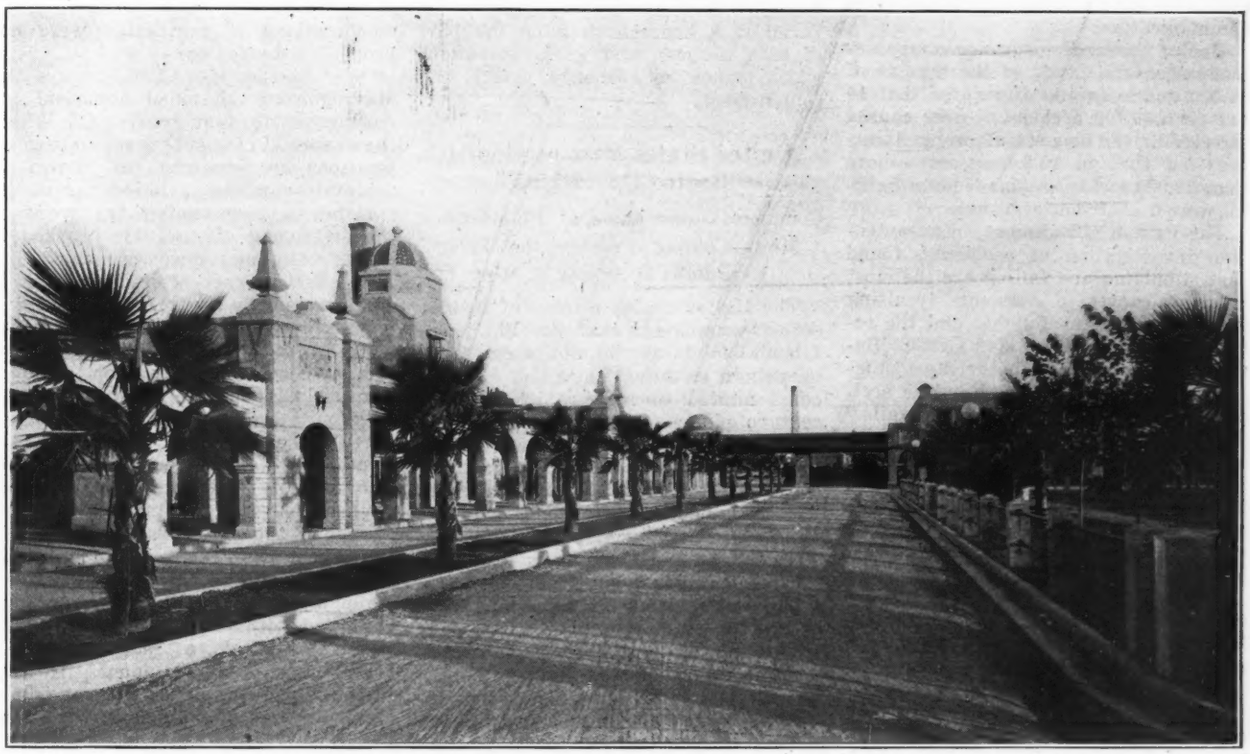
"To participate in store profits, employees must have been in the employ of the New Cornelia Copper Co., or allied companies for at least four months previous to the distribution of profits, which is made on December 20 of each year. This rule promotes the stability of the working force."

Actually the profit-distributing plan has worked, and resulted in substantial dividends.

"The following profits have been distributed by the Co-operative Store up to the present:

1917 (9 months)	$12,062.60	to 472 employees
1918	32,777.71	to 773 employees
1919	40,825.06	to 618 employees

"The average discount has been 15 per cent on total purchases by those who receive a share in store profits."



A STREET IN AJO, ARIZ., THE MINING TOWN BUILT BY NEW CORNELIA COPPER CO.

Lens Mines Resume Production

Pumping out of the coal mines of the Lens district is still in progress, as many of the mines are still flooded. The first coal brought to the surface there since the armistice in November, 1918, was hoisted July 20, 1920, according to an Associated Press report.

Plan New Token Money in France

Subsidiary Coin Supply To Be Reinforced and Safeguarded

Ever since the war began French currency has been reinforced by paper money of small denomination issued by, or rather guaranteed by, deposits at the Bank of France by the French Chambers of Commerce. These small bills were limited to circulation within the district of the Chamber of Commerce issuing or guaranteeing it. Today the steady and rapid disappearance of France's new silver coinage is compelling that country to adopt a similar policy for the protection of her supply of small change. According to a Paris correspondent of the *New York Evening Post*, the French mint has announced that metal counters, secured in the same manner as the small bills mentioned above, are to be issued and used as fractional currency throughout the republic. It is stated that:

"The new counters are to represent two francs (forty cents at par), one franc (twenty cents), and fifty centimes (ten cents). It will be impossible to make them a subject of illicit trading either for melting down or smuggling across frontiers, and they are not likely to be hoarded. They are to be made of an alloy nearly gold color, which will not tarnish like copper or bronze. They will have even the metallic ring associated with money."

In this connection it is interesting to note that a very recent advice from London states that in Germany the porcelain factory at Meissen is preparing, for the use of the cities of Meissen and Hamburg, porcelain tokens.

Good Lighting in Industry

It Fosters Safety, Contentment and Loyalty—The Cost Is Small for Results Attained

"Some one has said that light is a tool which adds to the efficiency of every other tool. The modern industrial manager goes a step farther, for he realizes that adequate lighting, both artificial and natural, is indispensable not only to efficiency but also to safety. He knows that the dark plant is the dangerous plant," writes C. W. Price, of National Safety Council, in a recent communication.

One of the large insurance companies made a careful study of the reports of 91,000 accidents and discovered that 10 per cent—9,100 accidents—were caused directly by the absence of proper lighting and that in 13.8 per cent—more than 12,000 accidents—inadequate lighting was a contributing cause.

The British government, in an extensive investigation of accidents, found that stumbling and falling are the most frequent causes of accidents resulting from the absence of light; and the report of the United States Census Bureau for 1918 says, "The greatest number of deaths charged to any one accidental cause, 10,330, is shown for falls." The investigation of the British government also revealed that during the four winter months deaths and serious injuries resulting from falls were 39½ per cent greater than during the four summer months, thus showing the bearing of light on accidents.

In all of the industries where efficient safety work is being done and where large reductions in accidents have been made, strong emphasis is placed on good general illumination of all departments. Investigations conducted by one of the leading illuminating engineers of America in 200 plants in which modern lighting systems were installed revealed that where rough work is being done, as in foundries and steel mills, the total output was increased 2 per cent, while in textile mills, shoe factories, machine shops and other industrial plants where fine work and close application are required, production has been increased 10 per cent by the installation of proper lighting equipment.

The economic value of good lighting becomes readily apparent when it is known that the overhead cost of adequate lighting is not more than one-half of 1 per cent of the payroll. In other words, a workman who is being paid $4 a day can be made a more efficient and a more careful workman through the expenditure of approximately 2c. a day for adequate lighting. Any plant manager appreciates that only a slight increase in production is necessary to add 2c. to the daily earning power of a workman.

Industrial managers are coming to realize that light not only increases output and decreases accidents, but also plays a most important part in making the plant a cheerful and pleasant place in which to work. In these days when management is giving the most serious attention to the attitude of men toward their work, and to questions of contentment and loyalty, a plant that is light, cheerful, and attractive no doubt has a great advantage over the dark, cheerless, and unattractive establishment.

Light has a positive influence in encouraging orderliness, cleanliness, and efficiency. In a plant where the windows have been washed, the walls whitened with paint specially designed to reflect light, and effective lighting installed, there has followed, almost invariably, a housecleaning on the part of both foremen and workmen—all of which makes for efficiency, safety, and contentment.

United States Mint at Manila Begins Operations

Complete Outfit Made at Philadelphia Mint—Coining Presses the First Ever Built at Any U. S. Mint

The United States Bureau of Insular Affairs is advised that the Philippine Islands mint at Manila commenced operations on July 15 and that the first coins minted there were bronze one-centavo pieces. The complete coining equipment at Manila is electrically operated and all its machinery has been constructed at our Philadelphia mint. The machinery as listed in the *Report of the Director of the Mint for the Fiscal Year 1919*, comprises 2 coining presses, 2 rolling mills, 1 cutting press, 1 topping machine, 1 strip shear, 1 upsetting machine, 2 tumbling barrels, 1 coin-reviewing machine, 1 automatic weighing machine, 1 six-foot bullion balance, 4 hand balances, 1 rotary annealing furnace, 6 oil melting furnaces, 5 sets of punches and beds, 5 ingot molds, and all accessories needed for the coinage of silver, nickel, and bronze.

The patterns of the coining presses are at the disposal of the United States, and these Manila presses, which have been built in the machine shops of the Philadelphia mint, are the first coining presses ever built in any mint in the United States. The accomplished task of designing, building, taking down and reassembling the equipment for the Manila mint, constitutes in itself a sufficient commentary on the ability and resources of the machine shop at the Philadelphia mint.

Students Flocking to French Mining Schools

There is a great congestion of applicants for admission to the French mining schools this year. The École Centrale has 3,000 candidates for about 540 vacancies; more than 900 are applying to the École Nationale Superieure des Mines, where there are but sixty-odd places; and for the sixty-five permissible admissions to the École des Mines de Sainte Etienne there are 250 candidates.

Breathing in Abnormal Atmospheres

Dr. A. Mavrogordato, M.A., M.R.C.S., of the South African School of Medical Research, recently lectured before the School of Mines, Johannesburg, Union of South Africa, on "Breathing in Abnormal Atmospheres." The follow abstract is from the *Financial Times* (London).

"Temperature, humidity and stagnation all entered into every atmospheric question. They were common factors in all work carried out in enclosed spaces, and were bound to have effect on breathing if ventilation were not properly attended to.

"For the purpose of his lecture Dr. Mavrogordato classified abnormal atmospheres into four groups: (1) Where the abnormal atmosphere was due to alterations in pressure, as shown in mountain climbing, aviation and in circumstances surrounding the work of the diver, and of men who worked in diving bells and deep caissons. The local effect of such alterations in pressure was felt by South Africans coming from the coast to the Rand, and vice versa by those who left this high altitude and went to a lower one. Mountain sickness and aëroplane sickness were quite common with many people.

"(2) The abnormal atmosphere obtained where air altered in composition. The normal constituents of air were oxygen (one-fifth), a trace of carbonic acid, and the remainder nitrogen. If the oxygen were removed the air would not support life; neither would it if the carbonic acid was increased. Sometimes they had both these things happening with fatal effects, as in the case of a recent fatal sewer accident. In that instance there would be present only a small amount of oxygen in the sewer and a very large amount of carbonic acid, and that was sufficient for a fatal effect. It was not due to any abnormal condition caused by sewer gas. It was, in fact, the 'black damp' of the mines, and was one of the great difficulties met with in the early days of the submarines—the presence of an abnormal quantity of carbonic acid formed in the process of the using up of the air within the submersible.

"(3) Then there were abnormal atmospheres caused by the fumes from burning explosives, introducing into the air the abnormal carbon monoxide. Coal gas was instanced by the lecturer, as were also the gases used in war—chlorine and phosgene.

"(4) The last abnormal atmosphere indicated was that caused by suspended particles in the air, reference being made to the dust problem, coal dust in coal mines and the harder and fatal dust of the Rand mines. According to the particular industry people were engaged in, where dust was prevalent, so there prevailed a particular type of trouble, instances being given of the diseases associated with the cotton and grinding industries and of the deadly fibrosis associated with quartz mining on the reef."

Book Reviews

Silver. By Benjamin White. Cloth, 5 x 7; pp. 144. Published by Isaac Pitman & Sons, Ltd., New York. Price $1.

We admire the compact form in which this handy little volume is issued. It is essentially the same book that appeared a few years ago under the same title in much greater and more impressive bulk. The present size is no criterion of its valuable contents, for although the size and price have decreased the value of the text has been enhanced by recent additions and changes to the pages.

The production, industrial consumption and utility of silver as money are dwelt upon at considerable length. Several chapters are devoted to descriptions of the silver minefields of the world and the modern methods of extracting silver from its ores. The historically interesting facts about silver used as an ornament, and in the arts generally, receive much attention. The evolution of British coinage is traced and the important part played by the Indian rupee and the Chinese tael and sycee in the demand and consumption of silver is interestingly and clearly expounded. Many tables and illustrations are interspersed throughout the text.

Not the least important feature in the book is the section describing the marketing of silver and the control over the silver market exerted by four London brokers. The author, from his lifelong association with the silver market, is well qualified to write upon this phase of his subject.

The book is well worth the attention of anyone interested in silver, whether producer, seller or observer.—F. E. W.

Technical Papers

Nickel Mining—There may be single ore deposits somewhere in the world of greater value, extracted and potential, than that of the Creighton mine, in Ontario, but we do not know where they are. To the end of last year, the mine has produced nearly nine million tons of about $35 ore, and the end is not in sight. The shoot of chalcopyrite and nickeliferous pyrrhotite dips at about 45 deg., and its cross-section varies in form from oval to narrow lenticular. The system of mining is shrinkage stoping, with main drifts in the foot wall, crosscuts in ore, and the use of rib pillars. The system of mining and the underground and surface equipment devised by J. C. Nicholls are scientific and modern, and the mine is one of the show places of America. It is described in an interesting manner in a thirty-six-page paper appearing in the "Bulletin of the Canadian Institute of Mining and Metallurgy" for July. (503 Drummond Building, Montreal; price not stated.)

Waste-Heat Boilers—The May issue of the "Proceedings of the Engineers' Society of Western Pennsylvania" (Union Arcade Building, Pittsburgh, Pa.; price 50c.) contains a thirteen-page article on this subject by members of the Babcock & Wilcox staff. Eight pages of discussion follow. Formerly, waste-heat boilers were constructed with a large gas-flow space to interfere as little as possible with the draft of the furnace to which they were attached. They were solely an appendage. As now designed, they are an integral part of the furnace installation and are generally provided with suction fans in the flue to maintain the draft to the stack. The article discusses the best arrangement to use, the subject of economizers, overload capacities, temperatures, and other interesting topics.

Potash—"Potash Deposits in Spain," (U. S. Geol. Survey Bulletin 715-A, 16 pages) and "The Potash Deposits of Alsace" (Bulletin 715-B, 38 pages) have been issued and may be obtained on application to the Survey at Washington, free of charge. In Alsace, mining began in 1909, and it is estimated that the known deposits contain the equivalent of about 300,000,000 tons of pure K_2O. The Spanish deposits were only discovered in 1913, and their extent is problematical. Suria and Cardona are the principal localities where the salts are found, and optimistic engineers report a potential production of 200,000,000 tons of pure K_2O at the former place.

Powdered Coal—Thirty pages of the May issue of the "Proceedings of the Engineers' Society of Western Pennsylvania" (Union Arcade Building, Pittsburgh, Pa.; price 50c.) are devoted to a paper on powdered coal and subsequent discussion. The subjects covered are: the conditions justifying the use of powdered coal; the cost of installation; the cost of handling and preparing coal; thermal efficiency; combustion; furnace and flue-gas temperatures; radiant heat; non-combustible matter; refractories; upkeep; human element; cleanliness; and safety. In an appendix, several pages of valuable data are given, including costs, comparing powdered coal against stoker firing of a 22,000-hp. boiler plant.

Australian Statistics—The Official Year Book of the Commonwealth of Australia, No. 12, brings up to the end of the year 1918 statistics on all manner of things connected with the commonwealth. It is a book of over 1,200 pages, containing a 29 x 39-in. orographical map of the country. Obtainable from the Commonwealth Bureau of Census and Statistics, Melbourne; price not stated.

Centrifugal Pumps—The mechanical principles underlying centrifugal pumps, their testing and practical operation, choice of motors for driving, and the methods of measuring head and discharge are described by Prof. R. S. Lewis in the *Mining and Scientific Press* for July 17. (420 Market St., San Francisco; price 15c.)

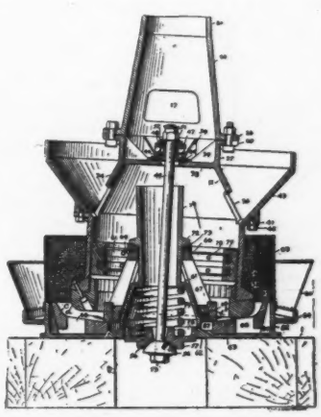
Recent Patents

1,341,686. Process of Extracting Platinum and Similar Metals from Their Sands and Ores. Russell Thayer, Philadelphia, Pa. Filed June 26, 1919.

A process for the recovery of platinum and similar metals from granular ore, which consists in commingling, with a charge of ore, a halogen compound of an alkali metal; subjecting the charge to the action of heat, whereby the metal is volatilized and removed from the ore; and collecting the volatilized metal, substantially as set forth.

1,344,584. Gyratory Crushing Mill. William W. Gibson, San Francisco, Cal. Filed Feb. 18, 1918.

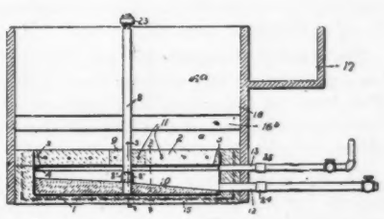
In a gyratory crushing mill, the combination of a die, a muller, means for gyrating said muller, a spring for pressing the muller toward the die, a



centrally located tension device for receiving said pressure from said spring, and rollers for receiving said pressure from said device and transmitting it to said muller.

1,344,123. Aeration Cell for Flotation Apparatus. Edward W. Engelmann and William T. MacDonald, Hayden, Ariz. Filed Oct. 16, 1918.

A gas-distributing means for flota-



tion apparatus comprising a cell having impervious concrete sides and a porous concrete top.

MEN YOU SHOULD KNOW ABOUT

L. F. Noble is preparing reports on nitrate deposits of southeastern California.

E. P. Mathewson, mining engineer, 42 Broadway, New York, N. Y., returned from Anyox, on July 17.

F. E. Downing, assistant general manager of the Shenango Furnace Co., is visiting the iron region of Alabama.

W. J. Loring, of San Francisco, Cal., was in Washington late in July. He was expected in San Francisco again by July 31.

Frederic R. Weekes, mining engineer, 233 Broadway, New York City, has returned from examination work in Montana and California.

Harold A. Linke, mining engineer, 266 Dooly Building, Salt Lake City, Utah, is at Hailey, Idaho, examining lead-silver properties.

Adolph Knopf and Mrs. Knopf, geologists, are at Mina, Nev., where they are engaged in a study of the ore deposits of the Simon district.

Frank M. Wichman, mining engineer, of Salt Lake City, announces that he is now at his new address, 307 Newhouse Building, Salt Lake City, Utah.

Mowry Bates, petroleum and mining geologist of Tulsa, Okla., will be in Wyoming and Montana on professional work during August and September.

George S. Rice, chief mining engineer, U. S. Bureau of Mines, is making a trip through western mining states during this and next month.

P. A. O'Brien, mining engineer, formerly manager of Constancia-Siempre viva mines, Pispis district, Nicaragua, was in New York City recently on a visit.

Jay Carpenter, formerly with the West End Consolidated and other Nevada companies, is now conducting a metallurgical testing works at Los Angeles.

K. C. Parrish, mining engineer, has established himself permanently in Barranquilla, Colombia, S. A., where he will engage in general engineering practice.

Col. John C. Greenway, general manager of the Calumet & Arizona Mining Co., is visiting the Eighty-five Mine, recently purchased in the Lordsburg, N. M., district.

Sir James Loughhead has recently been selected to succeed the Hon. **Arthur Meighen** as Canadian Minister of the Interior and head of the Department of Mines of the Dominion.

D. E. Winchester has completed his report for the Geological Survey on the oil shales of the Rocky Mountain region and now will devote his entire time to the direction of the oil shale operations of the Carter Oil Co.

Edwin E. Chase and **R. L. Chase**, mining engineers, Denver, Col., were making examinations of mining properties at Lake City, Ouray, and Rico, Col., during the third week of July.

A. C. Dart, of 1722 Williams Street, Denver, Col., is superintendent of the mine and mill of the Whale Mines Leasing & Reduction Co., at Cassells, Col., where he should be addressed.

Marshall O. Leighton, **C. T. Chenery**, and **A. C. Oliphant** have formed a copartnership under the name of M. O. Leighton & Co. with offices at 700 Tenth St., N. W., Washington, D. C.

Robert Linton, president of North Butte Mining Co., who has been in Butte, Mont., for a week in July looking over the company's properties, has gone to Nevada to inspect properties there.

ROYD R. SAYERS

Royd R. Sayers, past assistant surgeon in the Bureau of the Public Health Service, who has recently been appointed chief surgeon of the U. S. Bureau of Mines, completed a health survey of the Joplin, Mo., district shortly before his appointment in the Bureau of Mines. Dr. Sayers, who was born at Crothersville, Ind., in 1889, and obtained his primary schooling there, is a graduate in electro-chemistry of the University of Indiana. After completing that course he was graduated in medicine from Buffalo University and completed post-graduate medical courses at Chicago and New York. Immediately on finishing his schooling, Dr. Sayers joined the staff of the Public Health Service. His first assignment was at the Immigration Station at Ellis Island, New York. From there he was transferred to the Coast Guard cutter service which was engaged in ice patrol. He studied rural sanitation in Missouri and Oklahoma and was attached to the Hygienic Laboratory in Washington. At the request of the Bureau of Mines, the Public Health Service sent Dr. Sayers to the Butte district to study industrial hygiene. The assignment was extended so as to include several months' work in the Lake Superior region. Later he was put in charge of the study of the physiological effects of war gases. With the appointment of Dr. Sayers as chief surgeon, the Bureau of Mines is developing increased activity in the study of sanitation and general health conditions at United States mines. At present there is in progress a health survey of the iron district of the Lake Superior region, in which Dr. Sayers is himself taking some part. A similar survey is also being made in Utah. Dr. Sayers retains his commission as past assistant surgeon in the Bureau of Public Health Service.

Victor C. Heikes, of the U. S. Geological Survey, Salt Lake City, Utah, and **H. L. Williams**, of the Empire Zinc Co., Denver, Col., recently visited the Simon Silver Lead Mines Co. property in the Bell district, Nevada.

E. H. Gould, mining engineer with the Co-operative Mining Co., Lordsburg, N. M., has resigned to accept a similar position with the Duncan Mining & Milling Co., of Duncan, Ariz., whose general manager is **J. M. White**.

Arthur Crowfoot, superintendent of concentrators of Arizona Copper Co., has been spending a few days in Chicago and New York. On his way back from the East he visited Houston, Tex., to investigate the fuel-oil situation.

T. R. Arnold, chief electrician of the mining department of Arizona Copper Co., Ltd., Morenci, Ariz., has resigned to accept the position of electrical engineer for Southwestern Portland Cement Co., of El Paso, Tex., and Victorville, Cal.

Gerald G. Dobbs, safety engineer, St. Joseph Lead Co., Bonne Terre, Mo., has resigned to accept the position of general manager with the Southern Mineral Co., Winnfield, La. His present address is with the latter company at Winnfield, La.

L. A. E. Sauvage, professor in Ecole Nationale Supérieure des Mines, and Inspector General of Mines, Class II, has been retired at his own request. The decree of June 11 granting the request sets Aug. 16, 1920, as the date of retirement.

Rudolf Gahl, mining and metallurgical engineer, has been retained by Cerro de Pasco Copper Corporation, of New York, as consulting metallurgist in connection with that company's milling projects. Mr. Gahl sailed from New York on June 30 for Peru.

C. E. Carlson has been elected first vice-president of the Duluth, Missabe & Northern Ry. **Joseph Seifert** succeeds him as secretary of the railway. The new board of directors is: W. A. McGonagle, C. E. Carlson, J. W. Kreitter, J. W. Kempton, Joseph Seifert, W. H. Hoyt and C. W. Kieswetter.

J. Leonard Replogle, president of Vanadium Corporation of America and chairman of board of Replogle Steel Corporation, has been elected director of Berg & Hutton Steel Corporation in Teschen, Czecho-Slovakia, according to a *Sun and New York Herald* copyright Paris cable. Schneider Co. of Creusot, France, controls Berg & Hutton company.

Third International Mining Convention Held at Nelson, B. C.

Representatives of Mining and Allied Industries of Pacific Northwest Meet for Third Time This Year—Huge Market for Steel Declared To Exist on Coast by Nicol Thompson—Many Exhibits of Minerals and Manufactured Products

By L. K. Armstrong
Special Correspondent *Engineering and Mining Journal*

LOCAL and outside delegations, including about five hundred representatives of mining and allied industries, assembled in Nelson, B. C., on July 20-24, for the most notable convention yet held in this section of the Pacific Northwest. This, the Third International Mining Convention, held under the auspices of the Nelson, Slocan and Eastern British Columbia Mining Association, assisted by numerous other affiliated bodies, was also the third convention to be carried through to a successful conclusion this year in the territory mentioned. The first at Spokane was followed by one at Seattle and then, as if with the old German proverb in mind that "all good things are three," the third was arranged at Nelson.

About one hundred and fifty exhibits of the minerals and manufactures of the Northwest mining and manufacturing districts, together with displays of furs, publications, maps and reports of the Mines Department of the province were housed under one roof in the convention hall. The addresses and discussions in many cases bore upon these and on the opportunities for investment in the Pacific Northwest. The sessions were followed by excursions through Slocan, Ainsworth and other camps, thus affording the delegates abundant opportunity to inspect the mining and metallurgical operations at first hand. Delegations from local camps, Vancouver, Victoria, Seattle, Portland, Spokane and other points on both sides of the international boundary were in attendance.

Prominent among the visitors were R. F. Green, a member of the Dominion Parliament; Dr. W. O. Rose and J. H. Schofield; William Sloan, the Minister of Mines of British Columbia; and A. G. Langley and T. E. Freeland, resident engineers of the provincial Bureau of Mines.

After preliminary ceremonies of the usual sort in which Mayor J. A. McDonald, of Nelson, Mr. Sloan and others participated, the first session of the convention came to order with Sidney Norman, of Spokane, in the chair. Mr. Norman formally thanked Nelson and the citizens of British Columbia for the opportunity afforded those on the American side of the border to express their good will.

The first paper was presented by A. G. Langley, who gave a résumé of the mining industry in the Nelson district and dwelt on the important role filled by the prospector. J. W. Mulholland, president of the British Columbia Prospectors' Protective Association, followed. Mr. Mulholland pointed out the necessity for better roads and more of them, even though the province is unusually generous in the matter of road building. Following this was a luncheon served to about two hundred at the Strathcona Hotel, at which M. J. Carrigan, of Seattle, spoke on the subject of mining conventions.

The afternoon session was presided over by S. S. Fowler, manager of the Blue Bell mine. Nicol Thompson, chairman of the mining committee of the Vancouver Board of Trade, had for his subject the iron deposits of the Northwest in their relation to the manufacture of steel.

NELSON, B. C., ON WEST ARM OF KOOTENAY LAKE

Mr. Thompson stated that having been commissioned by a group of British and American capitalists to collect information on the iron resources of the Pacific Coast, he had found markets on the Coast for over two billion tons of steel per year, the Orient absorbing much of this in forms of final manufacture. There were abundant raw materials and manufacturing sites within the borders of British Columbia, and British ships to deliver the final products wherever desired. He was followed by H. J. Brown, of the Brittania Steel Rope Co. Mr. Brown spoke of the new wire rope company which he represents as being able to make and deliver at competitive prices to the Northwest markets.

Glenville A. Collins, of Seattle, spoke on the subject of financing the prospector whose ideals and ambitions, he said, should be fostered and whose ideas of finance must be remedied and corrected. He stated that stock selling methods are being succeeded by syndicating which requires grouping of prospects in concert with grouping of capital in order to determine financial sufficiency and competent management, both of which qualities, according to Mr. Collins, are foreign to the prospector.

At the session on the morning of the second day, L. K. Armstrong, of Spokane, occupied the chair. Mr. Armstrong cautioned patience in the present strained conditions of the mining business, and advised that a policy be pursued of stricter adherence to the principles of conservation of resources, as well in their use as in their preservation. S. S. Fowler addressed the delegates upon the subject of oxidized lead ores. He supplemented his speech with an exhibit of types of ores procured from the Blue Bell mine and vicinity, and cited the geological and mineralogical influences which produce such ores. Mr. Fowler stated that although prospectors do not usually regard these ores as important, a considerable tonnage had been produced from the Blue Bell and North Star mines, of British Columbia, and from the Electric Point mine, of Washington. In touching upon ore-dressing methods as practiced at the Blue Bell mine, W. Penick, who discussed the subject, cited the present practice in Arizona, where modern methods have been adopted after long research, with good results.

W. Pellew Harvey, of London, a member of the council of the Institute of Mining and Metallurgy, who at present is in the Northwest to look over the mining situation, met many old friends of his in British Columbia and consented to address the meeting. He stated that he has been engaged for some years in examining and estimating the mineral resources of other countries, and has now returned to look into the possibilities of aiding the development and preparation of minerals in British Columbia.

The afternoon session opened with Nicol Thompson, of Vancouver, in the chair. A short résumé was given of the recent advance in metallurgical practice. Special reference was made to the plans of the Consolidated Mining & Smelting Co. of Canada at its Trail smelter, where efforts are being made to increase production at this, the most complete metallurgical plant in America.

F. M. Smith, manager of the Bunker Hill & Sullivan smelter in the Cœur d'Alene district of Idaho, invited shippers to test the facilities of the plant when suitable rates can be obtained and conditions warrant the diversion of the surplus tonnage of lead ores elsewhere than to the local smelter. William Sloan, Minister of Mines of British Columbia, addressed the meeting on the potentialities of the mineral resources of the province, as only a man who is perfectly familiar with the subject can do. C. W. Beale, the British Trade Commissioner, entertained the delegates for a brief period with a discussion of inter-empire trade development. In his speech he indicated the usual British determination to convert war enterprises into others equally efficient but for commercial purposes.

Resolutions were passed condemning local bolshevism, and recommending that the Dominion government discourage it by legal action. Another resolution was introduced asking that all minerals found upon any reservations be made available to location and development by prospectors. The usual resolutions of thanks to all those responsible for the success of the convention were made a part of the record by unanimous consent. The success of the convention was in large measure due to the efforts of Fred A. Starkey, of Nelson, the secretary manager.

The mineral exhibits included many unusual specimens, such as manganese from Kaslo, mica from Tetejaune, bismuth-gold ore from Lardeau, native silver from the Boundary district, zinc ores from H. B. mine, and oil shales and crude petroleum from Flathead. Typical minerals were exhibited by A. G. Langley and another collection including about two hundred specimens was shown by A. H. Adam. Larger and more comprehensive displays have been shown before, but the exhibits reflected the trend of public inquiry.

THE MINING NEWS

LEADING EVENTS

Minerals Separation Hearings End at Salt Lake

Letters From Company's Secretary at New York to E. H. Nutter Read Into Testimony

The last hearing in Salt Lake City in the investigation by the Federal Trade Commission into the methods practiced by Minerals Separation has been concluded. The hearings will be continued in Denver, and later in the east. Letters exchanged between C. B. Allen, secretary of the company at the New York office, and E. H. Nutter, chief engineer at San Francisco, were read into the testimony and afforded further evidence as to the way in which possible infringers were checked up, as well as to the process of elimination by which, according to a letter from Mr. Allen, certain enterprises were classed as "useless and juiceless," and others as preferred infringers, which were to receive "prompt attention and plenty of action when the harvest time arrives." The term "coyote howlers" is used to designate licensees making complaints. Correspondence placed in the records showed that a local ore buyer had been employed to receive reports from men detailed to secure information in regard to operations at big plants, such as would be of value to Minerals Separation company. Most of the letters to the ore buyer were reports of the activities of two agents employed at the Butte & Superior and Miami mills, and reports of money disbursements made by him to them for Minerals Separation.

WEEKLY RÉSUMÉ

The new Mexican government is reported to be taking steps to collect delinquent mining taxes. A concession for a railroad in Sonora to San Jorge Bay on the Gulf is said to have been granted to promoters at Ajo, Ariz. In the Joplin-Miami district, the lead-zinc operators have succeeded in effecting a curtailment of 25 per cent in production. In the Coeur d'Alene district of Idaho, the Federal M. & S. Co. has insured all its employees. An option on the control of the Senator Mining Co., owning the east Flynn group, has been secured by the Coeur d'Alene Syndicate. In Canada, the amendments to the Yukon Placer Mining Act have been made effective. From Australia, it is reported that Great Cobar's assets are to be realized.

In Washington, the practice of using Pittsburgh as a basing point for steel prices has been upheld by the Federal Trade Commission. A hearing on the War Minerals Act before Secretary Payne has been scheduled for Aug. 10; Cuban claims for relief are now being studied.

Mexican Concession for Road to Gulf Reported

A concession has been granted by the new Mexican government to railroad promoters of Ajo, Ariz., for the construction of a railroad from the Mexican line in Sonora to San Jorge bay, located on the Gulf of Mexico, according to news received in Juarez recently. The railroad will start at Ajo, connecting with the line from Gila Bend to Ajo, which in turn connects with the Southern Pacific. It is understood that a survey of the proposed road will be made in the near future by the interests concerned.

A Letter from Mexico City

The Prospects for Silver Mining in Mexico

Special Correspondence

The pyrotechnic fall of silver frightened some people in Mexico, but does not appear to have left many scars. In some few cases certain heavy buyers were caught with $1.30 silver and were glad to unload at 90c. but these unfortunates were isolated and far between. The legitimate industry is still very much in the ring. For the last ten days silver has hung around 90 and 95c. an ounce and mining interests in which the white metal plays a predominent part have had a chance to catch their breath.

Last year Mexico produced 62,500,000 oz., more than 35 per cent of the silver output of the world, and it is predicted that the output this year will reach, possibly exceed 75,000,000 oz. This increase is expected because many properties heretofore abandoned are now being exploited by the most modern methods and literally hundreds of forgotten dumps and mines of low values are being optioned and preparations are under way for their intense exploitation. As an example, lively interest is now being shown in the old mining camp of Zacatecas where it was generally believed that its mines had been "bottomed" or exhausted. It is now found that ores on old dumps and those near the surfaces which could not be treated or handled with profit in former times, exist in abundance, and are profitable under any price of silver

above 90c. an ounce. In consequence all vacant mining ground in the Zacatecas district is being redenounced and options are being taken on nearly all the old abandoned properties which have been considered practically worthless.

Regarding the recent silver flurry it is the opinion of one of the most successful mining operators in the Republic that the drop in silver was about the best thing that could happen to the silver industry. His view is based on the argument and experience that we have had to the effect that the price of other commodities follow more closely the price of silver than any other metal. In common parlance, the squeezing of water out of any sort of stock does the legitimate operator no harm. The gentleman quoted cites for example that 40 per cent dynamite at present sells for about 35 pesos a case. The price of dynamite when silver was 50 to 60c. an ounce was about 15 pesos per case. This is a single item. Miners were better off with 56c. silver and 15 peso dynamite than they were with $1.30 silver and all the extraordinary costs of mining and treatment. According to this gentleman's views, if the silver miner in Mexico can obtain 90c., or better, on fine silver bullion, the industry is not only assured but production will break all records within the next few years. The sudden drop has, of course, caused some interruption among small miners, but with reasonable aid on part of the government, at least a friendly lift, the industry will strike a steady gait.

The government has already shown its friendly disposition by a reduction in the output tax and the presentation of a scale for material reduction in the tax on *pertenencias* or claims. Regarding the former, under special Presidential decree, silver at 60c. an ounce pays 5 per cent; from 60 to 75c., 5½ per cent; from 70 to 80c., 6 per cent; from 80 to 90, 6½ per cent; from 90c. to $1, 7 per cent; from $1 to $1.10 8 per cent; and from $1.10 to $1.20 9 per cent; and from $1.20 to $1.40, 10 per cent. Should silver exceed the price of $1.40 the tax will be 12 per cent. In addition to the above production tax, the amount paid in national currency is duplicated in old revolutionary currency paper which is worth 10c. on the peso, or an additional 10 per cent tax. This has been done for the purpose of retiring the last paper currency issued by the Carranza government. Aside from a reduction in production taxes the government has expressed its willingness to consider a substantial decrease in the yearly tax on *pertenencias* or claims. At present, the progressive system worked out by some astute mathematician under the immediate former regime has seriously affected the mining industry and has not produced the anticipated favorable results for the treasury, as many large companies forfeited their claims rather than submit to what they considered an imposition that was unwarranted. As an example, X mine with 347 hectares pays 6 pesos a hectare on the first 5 hectares; 9 pesos a hectare on the next 45 hectares; 12 on the next 50 and 18 on the following 247. Much of the time during the last five years the X mine has been unable to work because of brigandage, strikes incited by radical local officials, shortage of dynamite and other materials, not to mention extraordinary loans assessed or requested by either the ins or the outs, or both. With a frank desire on the part of the government to assist the miners, it will not be difficult to place the industry in general on its feet despite fluctuations in prices.

The principal feature affecting the mining industry at this writing is the strike at the smelters of A. S. & R. in Aguascalientes, Matehuala and Velardeña, the big steel plant in Monterrey and the Minerales y Metales smelter at Monterrey. Apparently the situation has been satisfactorily arranged at Aguascalientes by C. L. Barker, in charge, and there is a confident feeling that the entire strike problem will be settled. At Aguascalientes the pay of peons was advanced from one peso to one peso forty cents a day, and the rest of the employees receive an advance in wages of 25 per cent. At Monterrey, the question of recognition of the unions is one of the principal points of difference.

New York State Buys Radium for Medical Research

The purchase by New York State of two and one-quarter grams of radium, the largest commercial transaction of its kind ever made and the first purchase of radium by any state for a purpose of social utility, was announced by Governor Smith on July 26.

The acquisiton of the radium was made possible through an appropriation of $225,000 by the 1920 Legislature. The radium will be used for research work in behalf of the New York State Institute for Malignant Diseases, under the direction of Dr. H. R. Gaylord and his staff at Buffalo.

Elbow Lake District, Manitoba, Drawing Prospectors

Some Gold Discovered—Many Quartz Veins But Few of Promise—Section Held To Merit Investigation

The chief rocks of the Elbow Lake district of northern Manitoba, which is attracting attention at present, appear to have been originally for the most part intermediate or basic flows, with here and there tuffs and pyroclastics. These rocks have been highly metamorphosed and at present consist of massive green stones and chlorite-schists. In some places narrow bands of sericite schist occur, which were probably originally dykes of more acid composition. In a few places fairly large areas of these rocks occur. The whole complex has been referred to the Amisk series of rocks. Granite is intrusive into all the rocks of this area, though there are few occurrences actually on the lake. The mineralization has been generally ascribed to the later granitic intrusions. Near these the rocks of the Amisk series often look like diorites, but are probably greenstones impregnated with granitic material.

OUTCROP OF GOLD-BEARING VEIN DISCOVERED BY T. WEBB IN ELBOW LAKE DISTRICT, NORTHERN MANITOBA

There are a large number of quartz veins in this district but so far few give promise of sufficient values. At the north end of the lake, however, T. Webb has discovered a small vein in which gold occurs plentifully. Indeed, he has already collected about $1,000 worth of gold with pestle, mortar and pan. On a large island about two miles away he has located a fairly large dyke which carries some values. This dyke appears to have consisted of quartz and felspar. Considerable shearing has taken place. The felspars have been crushed and foliated, and only a few phenocrysts of quartz remain visible. There has been considerable development of secondary quartz, with which some galena occurs; the original dyke material is fairly well mineralized with iron pyrites. Some arsenopyrite is present, but whether in the original

dyke or the later mineralization was not ascertained. There is on the same property a remarkably irregular quartz vein, which is very well mineralized with pyrite, galena and some chalcopyrite or arsenopyrite. This vein pans freely and assays indicate a probable average of about $20 to the ton.

About two miles west of Webb's discovery of high-grade A. Forrest has located a quartz vein, pannings from which give indications of good values. Altogether the district would appear to be well worth investigation, though the large number of barren veins is apt to discourage the average prospector.

Novel Safety Contest in Butte

Much interest has been aroused in the Butte district over a safety first contest in which all the mines are participating. The contest started July 20 and will conclude Aug. 21. Daily results are being displayed on an "accident-o-meter," placed in the central part of the city and arranged with large glass tubes holding a colored liquid which rises and falls in accordance with the standings of the mines as they are kept free from accidents, all of which are recorded, no matter how trivial. The winning mine will be awarded a large banner at a miners' field day to be held at the Columbia Gardens in Butte sometime in August. The contest is designed to promote efficiency and curtail accidents. At a recent contest held in Cleveland, Ohio, a reduction in accidents of 35 per cent was shown.

Yukon Placer Mining Amendments Now Effective

Amendments to the Yukon Placer Mining Act, passed at the last session of the Canadian Parliament, have been brought into operation. The most important provision enables a man to secure prospecting rights on five miles of abandoned claim for a three-year period, or on one mile of virgin territory for one year. It is expected that this change will induce many mining men and prospectors who would otherwise have gone to Alaska to remain.

National Copper's Equipment To Be Sold

An inventory of all machinery, movable equipment and supplies owned by the National Copper Mining Co. of Mullan, Idaho, has been completed and several parties are understood to be figuring on buying the entire outfit, the estimated value of which is between $160,000 and $175,000. The equipment includes a modern 500-ton concentrator, flotation plant, electric motors, compressor, hoist, tool-sharpening outfit, and in fact everything necessary in the operation of a mine and mill employing 100 or more men. The appraisement does not include mine or mill buildings. In addition to these assets, the National company owns nine patented claims, four in process of patenting, a water right which with flume cost over $20,000, and 160 acres of land in the flat adjacent to the mill site.

Federal M. & S. Co. of Wallace, Idaho, Insures Employees

Another Large Company Adopts Practice Now Becoming Popular—Amount Ranges from $500 to $1,500

The Federal Mining & Smelting Co. of Wallace, Idaho, has insured the lives of all employees as from July 1 for the benefit of their families and dependents, the entire expense being paid by the company under a contract with the Metropolitan Life Insurance Co. of New York. The amount of insurance is graded according to length of service. All employees on July 1 who had been with the company less than one year were covered with $500 insurance and new employees will be covered with the same amount after three months' service. Employees with the company more than one year and less than two receive $600 insurance, and $100 is added each year thereafter up to the maximum sum of $1,500. The adoption of this insurance policy by the Federal company was announced by Frederick Burbidge, general manager, in a circular letter delivered to each employee.

Curtailment of Output Succeeds in Joplin-Miami District

Success that is gratifying to the mine operators of the Joplin-Miami district has attended the recent efforts to hold down production of zinc ores in this field. The present car shortage and the slackness in the zinc market ordinarily would have meant a rapidly accumulating surplus of ore in the bins, but this is being avoided by the combined effort of a majority of the heaviest producers in the field, who are putting into effect a systematic and carefully planned curtailment.

This curtailment was begun following the two weeks' complete shutdown starting June 26. During this shutdown the operators got together and decided that to meet the situation properly a curtailment of not less than 25 per cent should be put into effect, and proceeded to make plans for it. Contrary to the predictions of many in the field, it has been a complete success and careful estimates place the curtailment at fully 25 per cent. It will be maintained for several weeks, according to present plans, and should result in holding down the ore surplus that the car shortage would otherwise naturally cause.

Silver mining throughout Montana is beginning to decrease at a fairly rapid pace in consequence of the slump in the price of the metal. Leasing in the Butte district at the present quotation of the metal is said to be unprofitable and operations in this direction are showing a slowing up.

Unless there is a material enhancement in the silver price within the next three months it is said that silver mining operations aside from the larger companies will come to almost a standstill throughout the state.

Mexico To Collect Delinquent Mining Taxes

Companies May Secure Remission of Additional Charges by Paying Up for First Half of 1920

The *Diario Official* of Mexico City published on July 20 an executive decree relating to the payment of delinquent mining taxes in Mexico. Regulations covering the payment of taxes due are set forth in the decree, which provides that additional charges will be remitted to companies complying with the present laws and paying the taxes for the first two quarters of 1920.

"1. All the additional charges owed by those liable to the annual tax on mining property are hereby remitted, provided the parties interested pay the first and second quarters of the present year before Aug. 31 next.

"2. The proprietors of mines who were owing quarters previous to 1920 and shall have paid the two quarters of the year in conformity to the preceding article shall have the right to pay quantities (amounts) quarterly which they are in arrears in as many installments as there are quarters that they owe and thus settle the amount of one quarter in arrears every time they make payment on the regular taxes.

"3. If the parties involved do not take advantage of the exceptions established by this decree or do not make payment on the dates on which the respective periods for such payment expire this failure shall give occasion to the declaration that their respective titles are revoked without leaving room for any further recourse.

"4. The owners of mining properties who complied with the articles of the decree of June 28, 1919, shall continue to meet their obligations in accordance with that decree.

"5. The main tax officers are authorized to receive in conformity to the present decree the payments which those owing the annual tax on mining property may wish to make, but they should include at the end of the monthly accounts which they render to the Department of Hacienda a report in which they express the customary data with a notation as to whether the interested parties have complied with the exemptions referred to in the foregoing article.

"Transitory articles three, four, five, six and seven of the decree of June 27, 1919, are revoked."

Recent Production Reports

Compagnie du Boleo, Santa Rosalia, Baja California, produced 802,474 lb. copper in June against 650,908 in May.

G. F. Loughlin of the U. S. Geological Survey has just returned to Washington after visiting the old Chipman mine at Newburyport, Mass. He reports that the mine is being cleaned out rapidly. Five levels have already been reopened and some shipments of silver-bearing galena already have been made. Development, however, has not gone beyond the exploration stage.

NEWS FROM WASHINGTON

By PAUL WOOTON
Special Correspondent

Administration of War Minerals Act To Be Discussed

Mining Congress To Ask Changes at Hearing Before Secretary Payne—Cuban Claims Being Studied

The outstanding feature in the war minerals relief situation is the hearing scheduled for August 10 before the Secretary of the Interior, at which the American Mining Congress will request certain modifications of the policies of the War Minerals Relief Commission. At that hearing, it is expected that the whole question of the administration of the law will be discussed.

The Cuban claims under the War Minerals Relief Act are now being studied by the commission. A report on these claims is being submitted by D. F. Hewett, who made a personal examination of the property. An opinion by the solicitor of the Department of the Interior, which was confirmed by the Attorney General, admits the Cuban claims on the same basis as the domestic claims. The claims are mostly clear-cut as there is no question as to Government stimulation. At least two Government engineers visited Cuba during the war and urged increased production of manganese.

In the whole matter of stimulation, the commission is attempting to be particularly liberal. In all cases where the claimant admits that he had no direct stimulation, the commission inquires specifically if by any chance he attended a meeting addressed by a representative of the U. S. Bureau of Mines, the Geological Survey or any other Government agency, at which miners were urged to increase production of war minerals.

Awards recommended by the commission for the week ended July 17 are as follows (the name of the claimant, the mineral, the amount recommended and its percentage relationship to the amount claimed are shown): C. H. Plumb, manganese, $213.14, 3 per cent; Pillsbury, Crowder & Kay, chrome and manganese, $3,760.83, 67 per cent; Manganese Associates, manganese, $32,551.73, 13 per cent; Puterbaugh & Touhy, chrome, $5,993.88, 75 per cent; Charles Puterbaugh, chrome, $266.35, 41 per cent.

W. R. Crane, the chief engineer of the Commission, is in the field making personal examinations. Engineer Examiner Van Sicklen has left for the field to do similar work. Engineer Examiner Eddingfield is back at his desk after a leave of absence without pay to undertake private work.

The total amount of silver purchased up to July 15 under the Pittman Act was 7,165,130 oz.

Decision on Federal Taxation Regulations Soon

The Commissioner of Internal Revenue is expected to rule within a short time whether or not certain sections of the tax regulations applying to mines are to be amended or are to remain as they are. The discovery and depletion portion of the regulations are those most likely to be amended. With the exception of these clauses, the regulations are working out quite to the satisfaction of the specialists in the national resources subdivision of the income tax unit.

J. C. Dick continues as active head of the natural resources subdivision. He has made arrangements so as to be able to continue directing this work until January 1. C. F. Powell is in charge of the oil and gas section; O. R. Hamilton of the metals section; and G. M. S. Tait of the coal section.

Chief Engineer Visiting Bureau of Mines Stations

George S. Rice, the chief mining engineer of the U. S. Bureau of Mines, has left Washington on an important tour of the western experiment stations for the bureau. On this trip, Mr. Rice expects to call the attention of mining engineers to the possibilities of using liquid-oxygen explosives. During a trip in Europe after the war, he made a careful investigation of the uses to which liquid-oxygen explosives are being put. They were used successfully by the Germans as a military explosive, in addition to their extensive use in mining and quarrying operations.

Mr. Rice intends to discuss with Daniel Harrington, the supervising engineer of the bureau at Denver, the matter of ventilation in metal mines and the prevention and laying of siliceous dust. Mr. Harrington has been investigating these matters for several years. In this connection Mr. Rice will also confer with the bureau's representatives and other engineers at Butte.

Another object of Mr. Rice's trip is to look into matters pertaining to the leasing regulations relating to oil shales and coal. At Salt Lake City, Berkeley and Seattle, he will discuss with the station superintendents the program for mining investigation during the coming year.

On his return, Mr. Rice will attend the meeting of the American Institute of Mining Engineers at Houghton, Mich. He expects to call into conference on that occasion the bureau's mining engineers stationed in the Lake Superior district. At this conference the various mining problems in that region will be discussed.

Dismiss Protest in Pittsburgh Steel Basing Point Case

Federal Trade Commission Upholds Practice as Fair to Fabricators—One Member Dissents

The practice of using Pittsburgh as a basing point for steel prices has been upheld by the Federal Trade Commission in dismissing the protest of the Western Association of Rolled Steel Consumers. The vote on the dismissal of the case was 3 to 2. Commissioners Murdock, Colver and Gaskill voted for dismissal. In handing down the decision each commissioner made a statement. An extract from that of Commissioner Murdock is as follows:

"Those steel companies which have plants in the Pittsburgh section and elsewhere, under the practice in question, have sold steel at a less price at Pittsburgh than elsewhere. Steel made at Gary, or Duluth, has been sold to fabricators in or near those cities at higher prices than the Pittsburgh fabricators pay. Similarly, the fabricators tributary to Birmingham have been charged a higher price for steel than Pittsburgh price, although there is a differential which modifies the charge against Birmingham fabricators to a certain extent. This, taken alone and viewed separately, is discrimination on the part of a selling corporation having plants in and away from the Pittsburgh district, in the ordinary acceptation of that word. Its practice appears, at first blush, arbitrary.

"But there is a second approach to the problem—the consideration of supply and demand—which opposes the conclusion that it is an arbitrary discrimination such as is forbidden by the statutes herein invoked. It is not disputed that the Pittsburgh section is now the point of heaviest surplus production of steel in the United States. In the steel industry, the point of heaviest surplus production under the operation of the law of supply and demand necessarily must influence strongly the price in other markets with excess demand. Viewed in this light, a base price plus freight device is not discrimination, arbitrarily determined, and such as the statute forbids. Approaching the problem from this side, it would appear to follow that the force, functioning in the creation of a base price plus freight device, is the market-place law of supply and demand, not contrary to law but rather confusedly applied herein by differentials expressed in terms of freight rates."

A paragraph from Commissioner Colver's statement is as follows:

"The practice is not unfair competition with respect to the manufacturers of steel, nor does it inject an unfair

competitive element into the business of the fabricators. If the base price system were abolished, it might result in giving some advantage not now enjoyed to certain fabricators, but it would place other fabricators at a corresponding disadvantage. Thus, at best, the shifting of the boundaries of competitive fields probably would not affect the fabricating industry as a whole, except to throw it into confusion. The Pittsburgh base price was an established thing in the theory and practice of steel manufacture and sale when the steel fabricating industry came into being. It was one of the factors taken into consideration by fabricators when they selected the sites for their plants. It is no new thing; no unforseen factor imposed upon the fabricators. Therefore it does not project any new method of competition, fair or unfair, into the industry of steel fabrication."

Commissioner Gaskill, among other things, says:

"Whatever evil there may be in this base-plus practice and however great may be the inequalities which result, I fail to find in the powers of the Federal Trade Commission any remedy therefor. An unfair method of competition, according to the definition laid down by the U. S. Supreme Court in the Gratz case, must be opposed to good public morals or contrary to public policy; the former because characterized by deception, bad faith, fraud or oppression, the latter because tending unduly to hinder competition or create monopoly. If any principle is to be applied to the corporate ownership of a number of plants, differing from that applicable to the operations of a real person, and the location of the several corporate enterprises is to give rise to a different basis of price determination which will recognize a local price right, it will be necessary for Congress so to declare."

In his dissenting statement, Commissioner Thompson says in part:

"The strife caused by two competitors in seeking the business of a consumer, in the natural course, should reduce the price, whereas it is contended here that the price is never reduced but is increased in an artificial and arbitrary way in respect to steel manufactured in Chicago by taking the Pittsburgh price at which the corporation sells the material and adding on a 'fictitious' freight charge to that price. In my opinion, a *prima facie* case of an unfair method of competition has been made out sufficient upon which to issue a formal complaint. It may very possibly be that when the disputed claims have been subjected to the test of evidence and cross examination of witnesses, with a formal hearing before the Commission, the *prima facie* presented will fail."

Definite Program for Alaska Expected

With the return of the Secretary of the Interior from Alaska, it is expected that immediate steps will be taken to put into effect a more definite program looking to the stimulation of the industries of that territory. As the matter of improving transportation conditions between Alaska and the United States is regarded as the most acute factor in the situation, an effort is being made to work that out first. This task has been assigned to J. Y. Saint, of the Shipping Board, who is expected to enter upon the work at once.

NEWS BY MINING DISTRICTS

MEXICO

Planned To Unwater Soto Mines at Guanaceví—Asarco Smelter Running Two Furnaces

Durango

Guanaceví — Wilber Judson, representing Col. William B. Thomson's interests, has just been in Durango visiting their Guanaceví holdings, the properties that once belonged to Mexico Consolidated Mining & Smelting Co. The Soto Mines Co., one of their companies, is operating a 200-ton flotation plant. Unwatering of the mines is planned now. The erection of an 800-hp. electric plant in San Pedro, Guanaceví, and the driving of a big tunnel to Todos Santos and Predilecta are subjects of careful study on the part of the Soto people.

San Dimas—The San Luis Mining Co. is working its Tayoltita properties at full capacity. It has built a large hydroelectric plant for electrifying both mines and mills. The Mexican Candelaria Co. is following the same program; this company is the one controlled by Daniel M. Burns.

Otaez—The Basis Gold & Silver Mining Co. has been operating in the camp uninterruptedly for the last three years. It is working the mines and running its smelting plant, the bullion being shipped via Durango.

The properties of the Santa Cruz Mining Co. are being worked under the management of George Stoker with Lorenzo Elder as superintendent. A new manager is expected soon at the mines.

Topia—This camp has been idle for the last few years; but the Topia Mining Co. is now taking steps toward resumption of operations.

Avino—The properties of the Avino Mines, Ltd., are being worked by gambusinos. Gerald E. Norton is in charge.

Velardeña—The American Smelting & Refining Co. has started working the mines and mill. Its Asarco smelter is running with two furnaces.

Mexico

El Oro — The Esperanza company, which has been opening up a group of gold properties near Las Penas, in the state of Jalisco, is completing a 1,000-ton plant.

The Mexico Mines of El Oro are also spending a large amount in developing properties in the same vicinity. The revolutionary conditions that have interfered with operation in other sections of the country have apparently not affected work in this section.

Michoacan

A considerable force has been at work for some months on Las Truchas, one of the largest iron properties on the Pacific Coast, diamond drilling and sinking pits to demonstrate the extent of the fields.

Mescalhuacan—A French syndicate which has been working on gold properties near Mescalhuacan, Michoacan, has completed a 5-stamp test mill.

ARIZONA

Ray Verde Installing New Equipment To Deepen Shaft—U. V. Copper's Coke Bins Burned

Kelvin — The Cowboy mine, in the Dripping Springs district, is being reopened by its owner, C. W. McGraw. In the past the property has been worked for gold and at one time there was a small mill on it. At present the ores being mined are those of vanadium. A Moyle crusher and two Card tables have been installed. As soon as the gas engines are received milling will be started on the ore accumulated during the spring.

The Ray Verde Copper Co. has recently installed a hoist and compressor. The new equipment will be used in deepening the present two-compartment shaft. About fifteen men are employed.

Ray Boston Copper Co.'s No. 1 diamond-drill hole is down over 1,300 ft. Some ground had to be cemented off at about 1,260 ft., the formation having become softer and much more broken.

The old Bobtail and Copper King groups south of Ray have been taken over by eastern people, who are preparing to begin operations August 1. Considerable development was done years ago on the Bobtail group, which is now known as the South Ray. The Copper King, sometimes called the Alma group, joins the Ray Consolidated ground on the south and is owned by John A. Tillman.

Winkelman—The Antelope Peak company has had to suspend shipments

recently for a short time owing to a shaft accident. The last hundred feet of the shaft has been rendered unsafe by swelling and caving ground. Recently several sets of timbers went out. Development will be carried on at the 300-ft. level in the meantime.

The Continental Commission Co., operating the "79" mine, is rapidly completing the last stretch of new wagon road. This last section has been especially difficult to build, being all rock work and over a mile in length. For the present, shipments have been kept at a minimum and only a small force is at work in the mine. About 60 men are working on the road which should be open for use by August 1. Trucks will be put on to haul the ore to Burns from whence it is shipped to El Paso.

Sombrero Butte—The Magma Chief continues development and the management is having ore tests made preparatory to putting in a small concentrator.

Sonora — D. Durazo is installing a Gibson mill and concentrating table on the Saus property southwest of Ray, near Copper Butte. The property has been developed slowly during the last two years with a small force. The shaft has been sunk 100 ft. on a 2-ft. vein of gold ore. Some drifting has been done at 50 ft. and in all a considerable tonnage blocked out. The property is reached by wagon road from Ray Junction.

Miami—Certain employees of the Miami Copper Co. and Inspiration Consolidated recently asked through the grievance committees of their respective companies a general increase of $1 per day. The petition was based on the claim that the cost of living has advanced from 80 to 150 per cent since 1917, while wages have increased very little. The Miami company refused the request on the ground that the decreased price of copper made an increase in wages impossible.

Prescott—Settlement of accounts due from the Verde Apex Mining Co. is sought in a blanket suit filed on July 20 in behalf of Charles A. Raible, assignee for claims aggregating over $24,000.

Jerome — The old coke bins of the United Verde Copper Co. were destroyed by fire on July 14. The breaking of a pipe leading from fuel oil tanks at the same time caused a loss of several thousands gallons of oil which also caught fire.

Black Canyon District—In the Black Canyon mining district, Yavapai County, practically all properties are under bond. The Thunderbolt has 20,000 tons of good milling ore blocked out, and has recently made shipments of high-grade.

The Silver Zone, a promising prospect next to the Thunderbolt, is down about 140 ft. and is drifting in a northerly direction. The vein is 3 to 4 ft. wide and carries milling values of about 14 oz. silver per ton.

The Silver Cross company, with two groups of three claims each, is developing its Southern Cross group. A hoist and a three-drill compressor have been installed, and two shifts are working. The vein is 5 ft. wide in the narrowest place and the ore being mined averages 16 oz. of silver per ton. The company is controlled by Lawton Mines Finance Co., which also controls the L. T. S. Milling Co. operating a 50-ton custom mill nearby.

The Howard Silver Mining Co., which is developing the extension of the Southern Cross vein, has opened up good ore. A hoist is being installed. The Howard Copper Co., an affiliated corporation, is developing a copper prospect two miles away. The orebody was cut recently, and found to be about 18 ft. wide.

Kingman — William Neagle has brought suit for $50,000 against Hackberry Consolidated and G. S. Holmes on account of the conversion of stock in that corporation.

Chloride — During the first half of July three cars of ore have gone from Chloride to the Humboldt smelter. These were from the Altata, Rainbow and Dardanelles. The new cross cut to the shaft on the 100 level of the Dardanelles has been completed and the pump installed. Sinking to the 225 level is under way.

The Pay Roll has a day shift of five men at work getting ready for sinking the main shaft another lift.

Cerbat — The Dudley interests have closed down the Daisell. After a period of steady development for the last three years this property has a large tonnage of milling ore blocked out and is ready for a mill. As the management is busy with the final steps in equipping its C. O. D. property with a mill it was thought best to suspend operations at the Daisell for the time being. As soon as the C. O. D. plant is in operation, work will be started on the Daisell plant.

Hilltop—Construction by the Southern Pacific of a branch line from San Simon station to the property of the Hilltop M. & M. Co., in the Chiricahua Mountains, 26 miles away, is under consideration. Under the plan proposed, the mining company will pay the cost of construction.

CALIFORNIA

Central Eureka Shaft Completed—Mason Valley Mines Enters Engels District

Engelmine—The Uncle Sam group of 18 claims, located a half mile from the Engels Copper Co.'s property, has been taken over by John Reinmiller, formerly superintendent of the latter. There has been little development on the Uncle Sam, but it is said to have an unusually good surface showing. It adjoins the group of the Reinmiller Copper Mining Co., where the bottom of the 60-ft. shaft is in ore that averages better than 8 per cent copper. Reinmiller is driving a tunnel which will attain a depth of 110 ft. If the ledge is cut at this depth it is intended to drive another tunnel from the bottom of the hill and tap the vein at 450 ft.

The Mason Valley Mines Co. has also entered the Engels district and has taken over a promising group owned by Murphy & Barnes.

Sutter Creek—Sinking of the Central Eureka shaft was completed on July 18, and all timbers have been set in place. The main track will be extended and the 3,900-level station will be cut in hard rock without timbering. Because of labor shortage only twenty stamps are dropping this month in the mill.

Downieville—The Gold Exploration Co. has made a promising strike of gold ore. The orebody is said to be over 30 ft. wide and has been proved so for 200 ft. on the strike.

Oroville—The Table Rock Mining Co. near Howland Flat is steadily pushing development, despite labor troubles. A large deposit of excellent gravel has been reported.

A five-stamp mill at the Rose property near Rackerby has been purchased by the Horseshoe mine at Challenge, and will be erected at the Horseshoe.

Sonora—The Jones-Tarantula has uncovered high-grade gold ore in virgin ground. The property adjoins the Shawmut mine.

Nevada City—Litigation between the Twenty-one and Sixteen-to-One mining companies here has been closed by the Sixteen-to-One acquiring all of the property of the Twenty-one. The purchase price is stated also to liquidate the $60,000 judgment secured by the Sixteen-to-One against the Twenty-one in Federal Court a few months ago on the showing that ground belonging to the former had been worked by the latter. The mines of the two companies are located near Alleghany and are adjoining. Operations will continue through both tunnels.

At the Bunker Hill ore from the 600-ft. winze from which so much was expected is so low in value that it goes over the dump.

Some months ago the Pacific Gas & Electric Co. made application to the California Railroad Commission for permission to divert all water used for power in the Grass Valley district to the Bear River plant, for the generation of electricity for power. Opposition was raised from every user and principally by the Empire and North Star companies. The commission recently decided in favor of the water users.

The Golden Gate mine near the Idaho-Maryland has been permanently closed.

Because of a lack of pay ore and high costs the North Star Mines Co. has decided to abandon the Champion mine near Nevada City and dismantlement is in progress. There are two hoists and a 40-stamp cyanide mill.

The Alleghany M. Co., owners of the Tightner mine at Alleghany, have taken over the Gold Canon mine below Moore's Flat.

COLORADO

Mountain Top at Ouray Finds Faulted High Grade—Less Activity Owing to Drop in Silver

Ouray—A real "find" has been made by the Mountain Top Mining Co. Suspension of work on its high-grade orebody below the tunnel level, pending arrival of larger pumps, permitted development and prospecting of other ground above, where an unexplained disappearance of the ore streak had long been a subject of speculation. A small crosscut showed that the ore had been faulted about 18 in. and continued strong beyond the fault. Although this is not fully explored, it seems certain from previous development that the new ore is simply a continuation of the main high-grade body. Rough estimates are that this will add at least $300,000 in high-grade ore to the output in the near future. The ore is shipped crude and yields $100 to $300 per ton, most in silver.

Camp Bird continues active development, though with a small crew. The work consists principally of drifting west on the new tunnel level, with results not known to the public. No work on the mill is in evidence.

The Guadaloupe Leasing Co. is shipping its winter's accumulation of high-grade copper-silver ore and active work at the mines is temporarily suspended.

The Whitecloud M. & M. Co. continues development in the Monas Queen and Paymaster mines and is shipping its winter's stock of lead-silver ore. This comes from the orebody discovered in the Monas Queen.

E. R. Baur, of the Hidden Treasure, has opened the road and is shipping the large pile of excellent lead-silver ore mined last winter.

The only mills in operation are at the Atlas, Mountain Top, Red Mountain Mines, and Barstow; the last two are making summer runs only. Outside of active development on the Eurades, no other mining operations of importance are in progress. Silver Mountain Mines Co. continues development, driving a raise, with a small crew. The genuine activity in a preliminary way which was in evidence last spring has dwindled greatly; the fall in silver without doubt killed many embryo projects, although the more substantial ones are in active operation and the San Juan country is the most active and substantial mining district in the state.

IDAHO

Cœur d'Alene Syndicate Acquires Other Flynn Group

Wallace—The Cœur d'Alene Syndicate has taken an option on control of the Senator Mining Co. The Senator owns or controls what is known as the east Flynn group of claims joining another group owned by the Flynn Group Mining Co., control of which is already under option to the Cœur d'Alene Syndicate. In taking over the Senator the syndicate gains possession of all the ground between the Frisco on the west and the Morning and Star on the east aggregating forty claims divided about equally between the two Flynn groups. Under the direction of Rush J. White, mining engineer of Wallace, the Black Bear tunnel on Canyon Creek is being extended into the Flynn ground, a new compressor of large capacity is being installed and all necessary equipment provided for rapid development. Men prominent in mining affairs are associated in the Cœur d'Alene Syndicate and it is stated authoritatively that $225,000 has been set aside for the development of the Flynn ground. The trustees of the syndicate are Colonel S. W. Mudd and Phillip Wiseman, of Los Angeles. Others interested are D. C. Jackling, Horace V. Winchell, the North American Exploration Co. and its representative in this country, Carl O. Lindberg.

What appears to be an important ore shoot has been cut by a diamond drill in the Nipsic, owned by the Callahan Zinc-Lead Co. and which is being explored from the 600 level of the Callahan mine. The drill core, besides several feet of low-grade ore, shows about 2 ft. of high-grade lead-silver ore and about the same amount of high-grade zinc. Crosscutting to the strike is going on, the distance to go being nearly 400 ft.

The Bullion company in the St. Joe section of the Cœur d'Alene district, will build a 100-ton mill next year, according to James H. Taylor, manager, who states that sufficient ore is available to keep such a mill running for years. The ore is said to average better than 2 per cent copper and carries 6 or 7 oz. of silver and some gold. The mine is about 7 miles from the Milwaukee railroad, along the St. Joe River.

MICHIGAN

The Copper District

Wolverine Discarding Concrete Pillars for Timber on Lower Levels—C. & H. Shipping Copper Abroad

Calumet — Seneca Copper should reach the elevation of the terminal within ten days as sinking is now progressing at the rate of 20 ft. a week, and the fifth level is in sight. The third level has reached the southern boundary. The fourth level to the south will go 125 ft. further before reaching the boundary. The laterals to the north are continuing in the same good-looking high-grade Kearsarge lode. The second level, to the north, went to the boundary at 350 ft., but the lower levels, to the north, go an interminable distance. The thirteenth level of the Gratiot is now in 400 ft. and the copper runs about the same as formerly. Frederick Lewisohn, president; Walter Lewisohn, treasurer, and directors, W. F. Bartholomew and Thomas F. Cole, visited the mine last week.

Calumet & Hecla is shipping 1,500 tons of copper to France in one order, 500 tons to Montreal by rail, for foreign shipment on another order, and 1,600 tons of copper left Sunday by water for the East. The French order is billets and wire bars, a special order. Kenosha, Wis., took 320,000 lb. of Calumet copper during the week.

Houghton—Isle Royale is utilizing No. 3 hoisting plant from Tamarack, which is being set up at No. 5 shaft.

Mayflower's south drift has been opening good ground since the resumption of work in that direction. The raise to the west crosscut has been started and is breasted in trap. It is hoped that this work will cut the Mayflower lode. The north crosscut continues in the conglomerate, the same formation that was entered by the crosscut 140 ft. further west and 520 ft. from the shaft. Mayflower's development program at the 1,700-ft. level is far from complete and is continuing along practical and sensible lines.

Kearsarge—Wolverine is reopening No. 4 shaft with a limited working crew following suspension for twenty days, during which time concrete pillars on three lower levels, 26, 27 and 28, have been discarded and replaced by timber. All mines in the Lake Superior district that have tried the concrete experiment have come to the conclusion that it will not do as the shifting of the ground breaks the concrete.

Gogebic Range

Ore Shipments Improving But Coal Continuing Scarce—Large Coal Dock for Pabst Mine

Ironwood—The shipping situation continues to be the prime question with the mine operators. Ore shipments are now going forward at a slightly better rate, but coal is as scarce as ever. In June the ore shipped from this range was about 350,000 tons more than was shipped in June 1919, totaling about 1,300,000 tons.

Some of the steel for the Pabst-Puritan transmission line has arrived on the ground. The 50-ft. towers are to be erected on steel footings or anchors, instead of the usual concrete footings.

At the Pabst mine a coal dock is being built which will have a capacity of 35,000 tons. The coal will be stored in three or four parallel piles for safety from fire and will be loaded by locomotive cranes equipped with grab buckets and dumping into a movable hopper under which the small coal cars will run. An electric locomotive will haul these to the crusher, whence the coal will be taken by bucket elevator to the hoppers above the stokers in the new boiler house. This dock was made necessary by the uncertainties in the coal supply the last few years, and by additions to the load carried by this power plant.

The underground work at the Pabst mine was again stopped for a day recently by a breakdown in the haulage burned out.
system. The rotary converter had

Officials of the Steel & Tube Co. of America were on the Gogebic Range the week of July 22 visiting their Newport and Palms-Anvil mines.

JOPLIN-MIAMI DISTRICT

Missouri-Kansas-Oklahoma

New Development at Galena May Be Abandoned—Kansas Line Mill Started

Galena, Kan.—A pseudo mining revival in this veteran zinc-lead camp has apparently been knocked to smithereens by an old, old failing in mining communities. The Eagle-Picher Lead Co. had become interested in the stories of deep-ground deposits in the camp and is understood to have decided to make a careful investigation by drilling, provided something like 1,500 acres of leases could be secured as a preliminary assurance of a chance to get the development money back if deep-ground ore were found. To date about 800 acres of leases have been obtained for the company, but the proposition has been checked and possibly defeated by land owners who decline to give leases or else ask unreasonable bonuses. The officials of the Eagle-Picher company are known to be on the point of abandoning the whole project, which would necessitate extensive drilling and drainage work.

Baxter Springs, Kan.—The Kansas Line Mining Co. has started its 250-ton mill which is about three miles southwest of Baxter Springs. Early development is reported as promising. The principal production will be zinc. The plant is owned principally by J. C. Nichols, of Kansas City, and George C. Meese, of Joplin.

Picher, Okla.—The Cosmos mine of the Lucky Tiger Combination Mining Co. has recently completed a second field shaft and is now getting ore from it. A quarter-mile surface railway is used, with a gas locomotive, about 15 tons being taken each trip. The new shaft proves up ore deposits over the entire lease.

MONTANA

Barnes King Negotiating for Black Hawk Claim in Marysville District

Butte—Unofficial reports are to the effect that the No. 2 vein has been picked up on the 2,700-ft. level of the Colorado mine of the Davis-Daly company and that 9 ft. of good ore is in evidence.

Shipments from the Tuolumne Copper's Main-Range mine are ranging from 100 to 150 tons daily. A winze sunk from the 1,200-ft. level to a depth of about 50 ft. has afforded sufficient showing to warrant sinking the shaft, according to the management. This work will start Sept. 1 with the 2,000-ft. level the objective.

Sinking operations by the Butte & Plutus are disclosing well mineralized ground in the Plutus claim. The shaft on this property will be sunk to the 400-ft. level and a fissure in the Norwich claim adjoining crosscut.

Negotiations are in progress by the Barnes-King company to acquire the Black Hawk claim in the Marysville district of Montana. This property is in the neighborhood of the Shannon mine, the company's chief producer at present. It would occasion no surprise were the Barnes-King to suspend operations at its Gloster property, also in the Marysville district.

A statement will be issued soon by this company in connection with the opening of a high-grade orebody on its 2,500-ft. level by the Davis-Daly Copper, which company is working the deposit through a profit-sharing arrangement with the Butte & Ramsdell. The ore is said to run up as high as 20 per cent and to have a width of 5 or 6 ft.

NEVADA

Retimbering Broken Hills Shaft—Claims in Tolicha District Attracting Attention

Broken Hills—Arthur Perry Thompson, consulting engineer, has announced that three shifts will be put to work retimbering the main shaft of the Broken Hills mine to the 150-ft. level, after which the shaft will be continued on the vein and levels run every 100 ft. A new shaft, known as the Belmont, has been started on a newly discovered vein 500 ft. southeast of the main shaft.

The Utah, Nevada & Idaho Telephone Co. will extend its line from near the old camp of Fairview to Broken Hills, a distance of about 15 miles.

Virginia City—Three hundred tons of ore is being hauled from the West End mine in the Flowery district to the Fisher mill in the Sixmile Canyon section of the Comstock district. The vein from which this ore came is 20 ft. wide at a depth of 40 ft.

Plans for a new and extensive campaign of development on the Comstock-Phoenix have been agreed upon, according to George H. Drysdale, superintendent. The new plans call for additional work on the 800 level, and also for sinking a winze from the 800 to 1,200 level.

Eureka—The Eureka Holly shipped to the smelter last month 300 tons of ore averaging about $75 per ton. The main orebody averages 10 ft. in width.

The Eureka Climax is building a chute from the tunnel portal to ore bins on the road about 40 ft. below to handle the high-grade ore recently encountered. The tunnel, which is to crosscut the mountain, is in 1,100 ft.

Tybo—The smelter which was recently blown in at the Tybo mine is running smoothly and is said to be doing excellent work. The company has large reserves of crude ore, as well as concentrates from the 125-ton mill which has been in operation for some time. F. W. Draper is general manager.

Tolicha—Considerable interest has been attracted to the Tolicha district by the excellent showing which has been made on the property of Jack Jordan and "Jumbo" Yeiser. When the vein was tapped in a tunnel the values were not very high, but a drift found ore of better grade. The best showing is in a winze where at 10 ft. depth the entire bottom is in high-grade.

An option on the Southey and Staplin groups, two miles east of Tolicha on Quartz Mountain, has been taken by the W. J. Loring syndicate. There are big ledges on the properties and the new owners hope to develop large bodies of low-grade ore.

Osceola—Four feet of silver-lead ore of commercial grade has been encountered in a crosscut from the main working shaft of the Lucky Boy company near Osceola in White Pine County.

Goldfield—The Goldfield Deep Mines Co. has started to sink its 3,000-ft. vertical shaft on the Blue Bell section. This is intended to develop the Goldfield construction vein at depth below the proven ore-bearing area.

NEW MEXICO

Operations in Lordsburg District

Lordsburg—Ore shipments in June from the Lordsburg district totaled 97 cars, or 4,715 tons, of an approximate value of $75,725. The bulk of this went to the C. & A. smelter from its 85 mine. Fluorspar shipments were delayed owing to the operation of the Great Eagle mine changing hands, Bell & Wright having taken a lease and erected a new ore crusher at the S. P. Ry. ore platform.

The Bonney Con. is doing considerable work preparatory to installing new machinery. A topographical survey of the company's 700 acres will be started at once. Fifteen claims will be patented, making 22 claims so held.

Columbus—The Romaho Mining Co. in the Tres Hermanas Mountains, is erecting a new head frame at the Waterloo shaft and will install a new hoist, already on the ground. New buildings have been erected, a water supply established and by August 1 everything will be ready for development to the 300-ft. level. Robert L. Howze is president and J. Peter Mack superintendent.

UTAH

Miners Still Scarce in Most Camps—Ontario Silver To Resume on 2,000 Level

There is at present a scarcity of metal mine workers in Utah owing to various reasons. A good many of the men are supposed to have saved wages earned during the war, when their earnings were large, and to have applied the funds thus gained to the purchase of farms or to have entered into other enterprises. In the case of foreign labor many of this class have returned, after the prosperous years of the war, with their savings to their native countries. A considerable number of miners also are engaged in leasing.

Park City—The stock of the New York Bonanza, owning ground adjoining the Naildriver, and formerly included in the assets of the Merchants Bank, now defunct, has been acquired by Salt Lake men, who are planning to finance the company with eastern

capital for active development. The Naildriver is said to have developed an orebody within 50 ft. of the Bonanza line.

The Ontario Silver, after doing no work on the 2,000 level for 20 years, is planning to resume work there owing to its successful operations on the 1,700 and 1,800 levels, where persistent and strong shoots of shipping ore have been opened.

There were eight shippers from the Park City district in the week ended July 16, Ontario Silver heading the list with 1,450,000 lb. of ore and concentrates; Judge M. & S., 854,110 lb. ore and 412,000 lb. zinc; Silver King Coalition, 674,000; Daly West, 485,820; Daly Mining, 201,500; Naildriver, 230,000, and Keystone, 220,000; total, 4,528,-430 lb.

In the case of the Western Securities Co. as assignee of H. P. Clark, formerly president of the Merchants Bank, against the Silver King Consolidated, Solon Spiro, John Pingree, C. E. Kaiser and L. R. Eccles in regard to the sale of stock in the Silver King Consolidated given by Mr. Clark as security for money owed the mining company, the state supreme court has reversed the decision of the district court, which found in favor of the plaintiff, and declared the sale to have been valid, ordering the dismissal of the suit. Mr. Clark was indebted to the Silver King Consolidated to the amount of $50,000, for which he gave four notes, delivering 29,089 shares of capital stock in the company as security. In default of the payment of these notes the stock was sold by the mining company.

Eureka—Tintic shipments for the week ended July 16 amounted to 136 cars from 16 shippers, the Chief Consolidated heading the list with 36 cars. Others were: Tintic Standard, 30 cars; Eagle & Blue Bell, 10 cars; Grand Central, 9 cars; Dragon Consolidated, 8; Iron King, 7; Victoria, 7; Centennial-Eureka, 6; Mammoth, 6; Iron Blossom, 6; Gemini, 2; Tintic Drain Tunnel, 2; Colorado Consolidated, 2; Bullion Beck, 2; Gold Chain, 1, and Swansea Consolidated, 1 car.

WASHINGTON

American Arsenic Co. Has Small Mill Ready—American Mineral Production Board Reorganized

Index—The American Arsenic Co. has completed a 15-ton concentrator at its property four miles north of Reiter, a station on the Great Northern Ry. The ore is to be crushed by a jaw breaker and Hardinge mill, and then floated. It is principally realgar which occurs as a filling through a fractured zone in granite. A small production of high-grade red arsenic may be expected in the near future.

Valley—A reorganization of the Board of the American Mineral Production Co. has been effected. Howard F. Wierum has tendered his resignation as vice president and hereafter will serve as general manager and director.

WISCONSIN

Operations in Zinc-Lead District

Linden—C. W. Stoops and others have proved up the Jerry Rule lease adjoining the Fearless mine on the north. Seventeen drill holes indicate a good lode of high-grade blende at the average depth of 110 ft.

J. H. Dugdale and others have drilled the Optimo No. 3 property, which is equipped with a 150-ton mill, and plan to re-open it together with the Hinkle & Wicks, two other former producers.

Mifflin—Piquett & Altenburg have unwatered the old Squirrel, which is taken under sub-lease, and have begun mining.

CANADA

British Columbia

Road Work Started in Portland Canal District—Unwatering Blue Bell at Riondel

BY ROBERT DUNN

Stewart—The road work to be undertaken by the provincial government in the Portland Canal district will be started under the supervision of G. A. Young, of the Public Works Staff. Repair work on the Bear River road has already begun. Special attention is being given the tributaries of the Bear, along which there is much prospecting and mineral development.

Good ore is said to have been struck on the Unicorn Group, Salmon River, and ore of high grade has been brought into Stewart from the Glacier Creek property. An open cut 20 ft. long on the latter is in ore carrying galena and iron sulphides.

Nelson—Four of the levels of the Blue Bell mine, at Riondel, are being unwatered by a pump recently installed. Last year the Blue Bell shipped to Trail 1,249 tons of crude ore and 36 tons of concentrates.

Sandon—In order to sidetrack the famous slide on the Cody road to the Noble Five mine, a "cut-off" is to be constructed, work on which will start soon. The Washington, Argo Fraction, Majestic, Hope, Black Colt, Silver Hill, Cinderella, Chicago and Climax are properties in the Sandon district on which development is in progress.

Princeton—The Princeton Mining & Development Co. is working to put its property, situated five miles east of Princeton on the Great Northern Ry, on a shipping basis. There are three full claims on which the ledge has been opened by three tunnels. The operators assert that they have a large body of concentrating ore averaging 4 per cent in copper and 1 oz. in silver. A three-drill steam-driven compressor is in use and another is to be installed.

Ontario

Cobalt—The Gillies timber area, lying south of the Cobalt silver district, was thrown open to prospectors on July 20 with some reservations at the southern portion, which is heavily timbered. Many prospectors have gone in.

La Rose Mines has entered an action against the Mining Corporation of Canada and the Cobalt Reduction Co. to recover damages for the alleged conversion by the defendants of tailings from La Rose ore deposited by the Northern Customs Concentrator on the bed of Cobalt Lake, or on lands leased by the Cobalt Townsite Mining Co. and the Northern Customs Concentrator. As an alternative the plaintiff company asks that it receive a proper proportion of the tailings deposited on these lands.

Butt Township — The Mining Corporation of Canada has started work on its radium ore locations in Butt Township, where camp buildings are being erected preparatory to carrying on exploration work. Pitchblende has been found at three points in the district. It is stated that the ore occurs in patches throughout the main dyke, and that the commercial value of the discovery depends on whether these patches occur often enough.

AUSTRALIA

Great Cobar's Assets To Be Realized

From our Melbourne Correspondent

Melbourne — A representative of Great Cobar, Ltd., recently visited Australia and instructions have now been received to realize the assets on behalf of the debenture holders. This step will mean a big blow to Cobar and district and it is hoped that some steps will be taken so that the mine and works will not be altogether abandoned. Cobar is the center of an extensive copper mining area and there should be scope for a customs treatment plant to handle the ores from the smaller producers. It is unlikely that the property of the Great Cobar, Ltd., which comprises not only the Great Cobar mine but also the Cobar-Chesney copper mine, the Peak & Conqueror gold mines, and the Cobar gold mines will be worked again on the same scale, but the field is one that has still many years of life before it and justifies large scale operations on the lower grade deposits.

The Great Cobar, Ltd., which was floated in 1906 with a capital of £1,000,-000, and in addition raised debentures for £750,000, fell on evil days in 1914, a receiver being appointed in April of that year. Subsequently Mr. Pellew-Harvey was sent to Australia by the English debenture holders to report on the property, and in order to carry out his recommendations the sum of £102,-000 was raised, £40,000 of the amount being advanced by the New South Wales government. During the war period operations were profitable and the whole of this money, with interest, was refunded, but no interest was paid to the original debenture holders whose holdings were valued at £667,000. The ordinary shareholders had, of course, lost all their interest in the concern by this time. Operations ceased in March, 1919, owing to the low prices and the embargo on the export of copper.

THE MARKET REPORT

Published in part in San Francisco and mailed from there to our Western subscribers as a special service without charge pending the arrival of the *Engineering and Mining Journal*

Daily Prices of Metals in New York

July	Copper	Tin		Lead		Zinc
	Electrolytic	99 Per Cent	Straits	N. Y.	St. L.	St. L.
22	18.50@18.85	45.50	48.00@48.75	8.60	8.25@8.75	7.75
23	18.50@18.85	46.00	48.50@49.25	8.60	8.25@8.75	7.75
24	18.50@18.85	46.00	48.50@49.25	8.60	8.25@8.75	7.75
26	18.50@18.85	46.00	48.50@49.00	8.60	8.25@8.75	7.65@7.75
27	18.50@18.85	45.25	48.25@48.50	8.60	8.25@8.75	7.65@7.75
28	18.50@18.85	45.25	48.50@49.00	8.60	8.25@8.75	7.65@7.75

The above quotations are our appraisal of the average of the major markets based generally on sales as made and reported by producers and agencies, and represent to the best of our judgment the prevailing values of the metals for deliveries constituting the major markets, reduced to the basis of New York, cash, except where St. Louis is the normal basing point. All prices are in cents per pound.

Copper is commonly sold on terms "delivered" which means that the seller pays the freight from refinery to buyer's destination. The delivery cost varies, and it would be confusing to figure net prices on individual transactions. Consequently, an average deduction is made from the "delivered" price. At present the average cost of delivery from New York refineries is 0.15c. per lb., and that deduction is made to arrive at the New York price. When copper is sold f.o.b. or f.a.s. New York, of course no deduction is made.

Quotations for copper are for ordinary forms of wire bars, ingot bars and cakes. For ingots an extra of 0.05c. per lb. is charged and there are other extras for other shapes. Cathodes are sold at a discount of 0.125c. per lb.

Quotations for zinc are for ordinary Prime Western brands. We quote New York price at 35c. per 100 lb. above St. Louis. Tin is quoted on the basis of spot American tin, 99 per cent grade, and spot Straits tin.

London

July	Copper			Tin		Lead		Zinc	
	Standard		Electrolytic						
	Spot	3 M		Spot	3 M	Spot	3 M	Spot	3 M
22	91	93¼	107	263½	268	35¼	36	41½	43¼
23	91¼	93¾	107	270	275	37	38	42¼	44
24	...	...	...	...	...	...	...	...	...
26	92	94¼	108	270¼	275¾	37⅛	37⅜	42	44
27	92	94¼	108	267	271	36¾	36¾	41¾	43½
28	91	93½	108	267	271½	36¼	36¼	41½	43¼

The above table gives the closing quotations on the London Metal Exchange. All prices are in pounds sterling per ton of 2,240 lb.

Silver and Sterling Exchange

July	Sterling Exchange	Silver			July	Sterling Exchange	Silver		
		New York, Domestic Origin	New York, Foreign Origin	London			New York, Domestic Origin	New York, Foreign Origin	London
22	380	99½	93¼	55¼	26	378	99½	95	56⅜
23	377½	99½	91¼	54⅜	27	378	99½	93¼	55½
24	377¼	99½	91⅜	54½	28	377¾	99½	94¼	56⅛

New York quotations are as reported by Handy & Harman and are in cents per troy ounce of bar silver, 999 fine. London quotations are in pence per troy ounce of sterling silver, 925 fine.

On the authority of the Secretary of the Treasury, we quote 100c. per oz. for silver, 1,000 fine, delivered at the option of the Director of the Mint to the New York Assay Office or to the mints in Philadelphia, Denver, or San Francisco, and proved to the satisfaction of the Treasury Department to have been mined, smelted, and refined in the United States. This quotation is retroactive to May 13.

Metal Markets

New York, July 28, 1920

Whether caused by the midsummer business lull or not, the metal markets are certainly lifeless, and no business of any magnitude has been done during the last week. Prices have shown little variation. Producers are seriously considering the effect of the expected increase in freight rates, which are variously prophesied to be from 10 to 40 per cent. These will affect costs all along the line. Copper will feel the increased burden most, for this metal is sold delivered. The cost to the sellers will, therefore, probably be from one-half to one cent more than under present conditions.

Transatlantic freight rates on metal are now about as follows: England, $13 per long ton; Hamburg, $12; Rotterdam, $8; and Havre, $7@$8. There has been a slight reduction recently in the rate to Havre. Transpacific rates to Hongkong and Kobe are $11 per long ton.

Copper

The large producers are selling some metal to regular customers at 19c. delivered, but copper may be obtained of smaller producers and traders at from ¼@½c. less. Most of that sold now is for August-September delivery. Producers do not care to quote for anything later than October. Copper for shipment from Japan was offered last Thursday for 18½c. On Monday, English inquiry for electrolytic developed, and several hundred tons were sold at ¼c. under the domestic price. Export demand has, however, been only fair.

Small buyers have no difficulty in getting spot copper at 18½@18⅝c. delivered.

Lead

This metal continues scarce for all positions, but inquiries have not been as numerous, particularly the last two or three days. Small quantities, one or two cars, are in demand for spot and early August shipment, at 9@9.25c. New York and 8.75@9c. St. Louis. No one wants to sell futures, but one producer reports that 8.75@9c. has been realized for October lead. Another large interest is offering October lead in large quantities at 8½c. without finding buyers. Practically all sales have been on a contract basis, so that our price is largely governed thereby.

The storage-battery business is evidently booming, judging from the demand in that quarter.

Zinc

Business continues dull. Galvanizers apparently refuse to buy unless they can pick up a bargain. Producers who held for 7.80c. in the closing days of last week did no business, and a price of 7.75c. on Monday failed to prove attractive. A small amount of business was done at slightly under these figures.

Practically no price differential exists between spot and future delivery. The London price is now equivalent to about 6.50c. St. Louis.

Tin

Tin has been even more lifeless than usual, and only small amounts have been sold. Buyers in general want immediate shipment, and no demand exists for futures. Small quantities of electrolytic have been sold for whatever they would bring, from 46c. to 47c. Dealers hope for, rather than expect, an improvement by mid-August.

Straits tin for future delivery: July 22nd, 48.25@48.75c.; 23rd, 48.50@49c.; 24th, 48.75@49.25c.; 26th, 48.75@49.25c.; 27th, 48.25@48.50c.; 28th, 48.50@49c.

Arrivals of tin, in long tons: July 14th, Hongkong, 25; 21st, Liverpool, 10; 23rd, London, 420; 24th, Singapore, 225; 26th, Straits, 240; China, 125; 27th, Liverpool, 25; Singapore, 125; China, 225.

Silver

The general undertone of the London market has improved on Indian demand and a cessation of offerings from the Continent for the present. The China demand continues flat.

Our local market for foreign silver follows closely the London price, subject to fall in sterling exchange. Domestic demand is only moderate. The Mexican government is now buying from 1,000,000 to 2,000,000 oz. monthly for mintage purchases at about 4c. premium over N. Y. quotation. The U. S. Treasury continues to purchase domestic production, and has so far bought a total of about 8,500,000 oz. under the Pittman Act.

Mexican Dollars—July 22, 70¼; 23d, 68⅜; 24th, 68¾; 26th, 71⅛; 27th, 71; 28th, 71⅛.

Gold

Gold in London on July 22d, 107s. 9d.; 23d, 108s. 3d.; 26th, 108s. 9d.; 27th, 108s. 9d.; 28th, 108s. 9d.

Foreign Exchange

Unsettled political conditions in Europe and increased exports from this country, caused by the slackening of domestic demand and the recent more favorable exchange rates, have combined to depress somewhat the value of foreign money during the last week. On Tuesday, francs were 7.85c.; lire, 5.54c.; marks, 2.45c. and New York funds in Montreal, 13⅛ per cent premium. Argentine exchange has declined further to 88.15c.

Other Metals

Aluminum—Ingot, 33c. per lb., with 32c. open market for 98@99 per cent virgin.

Antimony—Market continues weak. Spot, 7½c. per lb.; Cookson's "C" grade, 14c. Chinese and Japanese brands, 6¾c. W. C. C. brand, 9c. Chinese needle antimony, lump, firm at 9@10c. per lb. Standard powdered needle antimony (200 mesh), 10@12c. per lb.

Bismuth—$2.70 per lb., 500-lb. lots. Market quiet.

Cadmium—Nominal, $1.40@$1.50 per lb. Market dull.

Cobalt—Metal, $2.50 to $3 per lb.; black oxide, $2 per lb.

Iridium—Nominal, $350 per oz. Heavy demand, but small supplies.

Magnesium—Crude, 99 per cent or over pure, $1.75 per lb., for the metal in 100 lb. lots and over, f.o.b. Niagara Falls.

[1]**Molybdenum Metal** in rod or wire form, 99.9 per cent pure, $32@$40 per lb., according to gage.

Nickel—Ingot, 43c.; shot, 43c.; electrolytic, 45c.; Monel metal, shot, 35c.; blocks, 35c., and ingots, 38c. per lb.

Osmium—Open market, $50@$75 per troy oz.

Palladium—$80 per oz.

Platinum—Market weak at $80@$85 per oz.

Quicksilver—Market steady; $88@$90 per 75-lb. flask. San Francisco wires $85. Weak.

Ruthenium—$200@$220 per troy oz.

[1]**Selenium**, black, powdered, amorphous, 99.5 per cent pure, $1.75@$2 per lb.

[1]**Thallium Metal**—Ingot, 99 per cent pure, $20 per lb.

Metallic Ores

Bauxite—About 52 per cent alumina content, less than 2 per cent iron oxide, up to 20 per cent silica and artificially dried to contain not more than 4 per cent free moisture, $10 per gross ton at mine; 54 per cent alumina and about 15 per cent silica, $11; averaging 57 per cent alumina, 8 to 12 per cent silica, less than 3 per cent iron oxide, $13 on basis of 8 per cent free moisture. Ores of very low silica content suitable for the manufacture of aluminum oxide and hydrate of alumina command a fancy price.

Chrome Ore—Guaranteed 50 per cent Cr_2O_3 foreign ore with a minimum of 6 per cent silica, 80@85c. per unit, New York. California concentrates, 50 per cent Cr_2O_3 and upward, 60@65c. per unit, f.o.b. mines.

Iron Ores—Lake Superior ores, per ton, delivered at Lower Lake ports: Old Range bessemer, $7.45; Old Range non-bessemer, $6.70; Mesabi bessemer, $7.20; Mesabi non-bessemer, $6.55. Congestion at Lake Erie ports due to car shortage has resulted in decreased tonnage. Other ports show gain in shipments.

Manganese Ore—75@80c. per unit, 50 per cent Mn content, c.i.f. Atlantic seaport; chemical ore (MnO_2) $75@$85 per gross ton.

Molybdenum—85 per cent MoS_2, 60@85c. per lb. of contained sulphide, New York.

[1]**Tantalum Ore**, guaranteed minimum 60 per cent tantalic acid, 65@70c. per lb. in ton lots.

Titanium Ores—Ilmenite[1], 52 per cent TiO_2, 2c. per lb. for ore. Rutile, 95 per cent TiO_2, 15c. per lb. for ore, with concessions on large lots or running contracts.

Tungsten Ore—Scheelite, 60 per cent WO_3 and over, per unit of WO_3, $7 f.o.b. mines; wolframite, 60 per cent WO_3 and over, per unit of WO_3, $6.50@$7.50, in New York.

Uranium Ore (Carnotite)—$2.75@$3 per lb. for 96 per cent of the contained oxide (U_3O_8). Ores must contain a minimum of 2 per cent U_3O_8.

Vanadium Ore—$1.25 per lb. of V_2O_5 (guaranteed minimum of 11 per cent V_2O_5), New York.

Zircon—Washed, iron free, 5c. per lb. Zirkite—$90@$100 per ton, carload lots. Pure white oxide, 99 per cent, is quoted at $1.15 per lb. in ton lots.

Zinc and Lead Ore Markets

Joplin, Mo., July 24—Zinc blende, per ton, high $51.50; basis 60 per cent zinc, premium, $48.50; Prime Western, $47.50; fines and slimes, $45@$42.50; calamine, basis 40 per cent zinc, $36. Average settling prices: Blende, $44.24; calamine, $37.04; all zinc ores, $44.16.

Lead, high, $102.95; basis 80 per cent lead, $92.50@$100; average settling price, all grades of lead, $99.85 per ton.

Shipments for the week: Blende, 6,777; calamine, 78; lead, 1,839 tons. Value, all ores the week, $431,950.

Two consecutive weeks' buyers responded to the demand of sellers for an advance each week of $2.50 per ton, but declined flatly to consider another advance of $2.50 this week, prices of zinc blende remaining, therefore, unchanged. Calamine was advanced $1 per ton and lead $7.50 per ton.

Platteville, Wis., July 24—Blende, basis 60 per cent zinc, $51@$53 base for high grade. Lead ore, basis 80 per cent lead, $95 per ton. Shipments for the week: Blende, 1,314; lead, 151 tons. Shipments for the year: Blende, 40,223; lead, 3,645; calamine, 2,240; sulphur ore, 1,098 tons. Shipped during the week to separating plants 2,032 tons blende.

Non-Metallic Minerals

Asbestos — Crude, No. 1, $1,800@$2,500; No. 2, $1,100@$1,500; spinning fibres, $400@$700; magnesia and compressed sheet fibres, $300@$400; shingle stock, $100@$150; paper stock, $60@$80; cement stock, $17.50@$30; floats, $8.50@$15, all per short ton, f.o.b. Thetford, Broughton, and Black Lake mines, Quebec, Canada; 5 per cent to be added as Canadian royalty export sales tax. Freight rate from mines to Sherbrooke, Quebec, over Quebec Central R.R., 20c. per cwt.; from Sherbrooke to New York, 27½c., carload lots; freight to New York for crude No. 1, f.o.b. Thetford mines, $8.45 per ton, carload lots.

Barytes — Crude, 88 to 94 per cent barium content, $10@$12 per net ton; ground (white) $22@$25 in bags, carload lots; (off-color) $18@$20 in bags, carload lots; all f.o.b. Kings Creek, S. C. Crude, 88 to 94 per cent, $12 per gross ton; ground (white) $23@$25; ground (off color) $16@$19 per net ton, f.o.b. Cartersville, Ga. Crude, 88 to 94 per cent, $23; ground (white) $40.50; ground (off color) $27 per net ton, less than carload lots, f.o.b. New York. Crude, not less than 98 per cent, $11@$11.25 per ton, f.o.b. cars, Missouri; floated, $28 per ton in bbls.; $26.50 per ton in 100-lb. bags; extra charge for bags, f.o.b. St. Louis.

Chalk—Domestic, extra light, 5@6c. per lb.; light, 4½@5½c.; heavy, 4@5c; English, extra light, 5@7c.; light, 5@6c.; dense, 4½@5c. per lb., all f.o.b. New York.

China Clay (Kaolin) — Crude, $9@$12; washed, $12@$15; powdered, $18@$22; bags extra, per net ton, f.o.b. mines, Georgia; crude, $8@$12; ground, $15@$40, f.o.b. Virginia points. Domestic lump, $10@$20; powdered, $25@

[1] Furnished by Foote Mineral Co., Philadelphia, Pa.

$30; imported lump, $25@$35; powdered, $30@$60, f.o.b. New York.

Feldspar—Crude, $7.50@$8 per gross ton, f.o.b. Maryland and North Carolina points; $7.50@$10 f.o.b. Maine; ground, $22@$30, car lots, f.o.b. Baltimore; ground, $17@$20, f.o.b. North Carolina points; $17@$20 per ton, No. 1 ground, f.o.b. New York State; $21@$23 per ton, ground, f.o.b. Maine.

Fluorspar — Gravel, guaranteed 85 per cent calcium fluoride and not over 6 per cent silica, $25 per ton, f.o.b. Kentucky and Illinois mines; ground, suitable for acid, chemical or enameling purposes, $60; lump, $17.50, f.o.b. Tonuco, N. M.

Graphite—Crucible flake, 85 per cent carbon content, 8c. per lb.; 88 per cent, 9½c.; 90 per cent, 10½c., all f.o.b. New York. Crucible grades of Alabama graphite sell as follows, f.o.b. Ashland, Ala.: 80 per cent, 5c.; 90 per cent, 10c. Lubricating grades in increasing demand, with price ranging from 11c. for the 85 per cent guaranteed grade in car lots to 30 and 40c. for higher grades. Mexican, amorphous, $45@$55 per short ton; Korean, 3½c. per lb.; Madagascar, 8c.; Ceylon, 4½@15½c.

Gypsum—Raw crushed rock, $3.50@$4 per ton; raw ground fine, $4@$4.50; calcined stucco, $9, all f.o.b. works. Containers extra. Wholesale, plaster of paris, carload lots, $3.75 per 250-lb. bbl., alongside dock, New York.

Kaolin—See China Clay.

Limestone—Dolomite, 1@2 man size, $1.60@$1.65; 2@8 in., $1.55@$1.65 per net ton, f.o.b. Plymouth Meeting, Pa.; fluxing, $1.65@$1.75 per net ton, f.o.b. Howellville, Pa.

Magnesite, Calcined — High-grade caustic calcined, lump form, $35@$40 per ton, carload lots, f.o.b. California points. Freshly ground calcined, suitable for flooring trade, $65@$75 per ton, f.o.b. Eastern points.

Dead-Burned — $32.50 per net ton, Chewelah, Wash.; $50@$60, Chester, Pa. Austrian grade, $52@$55 per ton, f.o.b. Baltimore. (Magnesite brick—See Refractories.)

Mica—Imported block mica slightly stained, per lb.: No. 6, 50c.; No. 5, $1.20@$1.40; No. 4, $2@$3; No. 3, $4.25@$5; No. 2, $5.50@$7; No. 1, $8. Clear block: No. 6, 55c.; No. 5, $2; No. 4, $4; No. 3, $5.75; No. 2, $7; No. 1, $9; A1, $14; extra large, $25, all f.o.b. New York; ground, $85@$100 per ton, Philadelphia.

Monazite — Minimum of 6 per cent thorium oxide, $35 per unit, duty paid.

Phosphate Rock—Per long ton, Florida ports: 77 per cent tricalcium phosphate, $13; 75 per cent, $11.50; 75@74 per cent, $11; 70 per cent, $8.35; 68 per cent, $7.85; 68@66 per cent, $7.60. There is no price schedule for spot for domestic uses.

Pumice Stone—Imported, lump, 4@50c. per lb.; domestic lump, 6c.; ground, 4@7c., all f.o.b. New York.

Pyrites—Spanish, fines, per unit 12c., c.i.f. Atlantic seaport; furnace size, 16½c.; run of mine, 12@14c.; domestic, fines, f.o.b. mines, 12@14c.

Quartz—(Acid tower) fist to head, $10; 1¼ to 2 in., $14; rice, $17, all net ton, f.o.b. Baltimore; lump, carload lots, $5@$7.50 net ton, f.o.b. North Carolina mines. F.o.b. Wausau, Wis., the price is $16 per ton in car lots, and $20 in less quantities, including bags.

Sulphur—$18 per ton for domestic; $20 for export, f.o.b. Texas and Louisiana mines.

Talc—Paper making, $9.50@$14 per ton; roofing grades, $8.50@$9; rubber grades, $9@$15, all f.o.b. Vermont. California talc, $20@$35, talcum powder grade. Southern talc, powdered, carload lots, $12 per ton; less than carload, $15, f.o.b. cars; freight to New York $5.25 per ton, carload lots; less than carload lots, $9.25. Imported, $60@$70; Canadian, $10@$20 per ton.

Mineral Products

Arsenic—White arsenic, 15½c. per lb.; sulphide, powdered, 20@21c. per lb., f.o.b. works, carload lots.

Nitrate—Soda, $3.85 per cwt., ex vessel, Atlantic ports. Market quiet.

Potassium Sulphate—Domestic, $2.25@$2.50 per net ton, basis 90 per cent, f.o.b. New York.

Ferro Alloys

Ferrocarbontitanium—For 15-18 per cent material, $200@$250 per ton, f.o.b. Niagara Falls, N. Y.

[1]Ferrocerium—Per lb., $12@$15. Foreign conditions as affecting the price of American goods remain unchanged.

Ferrochrome—Carload lots, spot and contract, 60 to 70 per cent chromium, 6 to 8 per cent carbon, 17@18c. per lb. of chromium contained; 4 to 6 per cent carbon, 19@20c. f.o.b. works.

Ferromanganese—For 76@80 per cent, $225, freight allowed; Spiegeleisen, 18 to 22 per cent, $75, f.o.b. furnace.

Ferromolybdenum—Standard grades, carrying from 50 to 60 per cent molybdenum metal, with low sulphur, phosphorus, and arsenic, $2.50@$3 per lb. of contained metal, f.o.b. works.

Ferrosilicon—For 10 to 15 per cent, per gross ton, f.o.b. works, $60@$65; 50 per cent, $80@$85; 75 per cent, $150@$160.

Ferrotungsten—70 to 80 per cent W, $1.10@$1.15 per lb. of contained tungsten, f.o.b. works.

Ferro-uranium—35-50 per cent U, $7 per lb. of U contained, f.o.b. works.

Ferrovanadium—Basis 30-40 per cent, $6.50@$8.25 per lb. of V contained, f.o.b. works.

Metal Products

Copper Sheets—No change in Jan. 7 price of 29½c. per lb.; wire, quoted 32½c.

Lead Sheets—Full lead sheets, 12½c.; cut lead sheets, 12½c. in quantity, mill lots.

[1]Furnished by Foote Mineral Co., Philadelphia, Pa.

Nickel Silver—Unchanged at 39½c. per lb. for 18 per cent nickel.

Yellow Metal — Dimension sheets, 26¾c.; sheathing, 25¾c.; rods, ⅜ to 3 in., 23¾c.

Zinc Sheets—$14.50 per 100 lb., less 8 per cent on carload lots, f.o.b. smelter; zinc plates, 14c. per lb.

Refractories

Bauxite Brick—56 per cent alumina, $145 per 1,000, f.o.b. Pittsburgh.

Chrome Brick—$90@$95 per net ton, carload lots, eastern shipping points.

Chrome Cement—45 to 50 per cent Cr_2O_3, $50 per net ton, and $55 in sacks, carload lots, eastern shipping points.

Clay Brick — First-quality fire clay, 9-in. shapes, $45@$53 per thousand, Pennsylvania, Ohio, and Kentucky works; second quality, $40. First quality, St. Louis, $45; New Jersey, $75.

Magnesite Brick—$100 per ton, eastern shipping points; 9-in. straights, $90@$100; 9-in. arches, wedges and keys, $95@$105; soaps and splits, $110@$120.

Silica Brick—9-in. per 1,000, $51@$55, Birmingham, Ala.; $50@$55, Mount Union, Pa.; $55, Chicago district.

Iron Trade Review

Pittsburgh, July 27, 1920

The shortage of gondola cars for shipping steel mill products, as well as pig iron, has grown still greater in the last week. In box cars there is no appreciable improvement, but there has hardly been any change for the worse in several weeks. The gondola car shortage is due, of course, to the preference being given the coal mines. Strong hopes are now entertained that this preference will soon be found to have performed its function.

Pig Iron—The strained situation in the pig-iron market is still more pronounced, with many furnaces piling iron, stocks being now fairly large. A few consumers are seeking to buy actual deliveries, almost regardless of price. If transportation conditions should permit the sudden moving of a large quantity of iron the market situation might be entirely reversed. We quote: Bessemer, $46; basic, $46; foundry, $45, f.o.b. Valley furnaces, freight to Pittsburgh being $1.40.

Steel—A sale of 3,000 tons of sheet bars for early shipment is reported, for conversion, at $75, buyer's option, bessemer or openhearth, and this seems to be the prevailing market for conversion bars, but some mills believe they could buy from regular sources at $70. Billets are inactive, and practically nominal at $60@$65, buyers being interested in getting deliveries, already long delayed, against old purchases.

Charcoal and Coke

Charcoal—Willow, 7c. per lb. in bbls.; hardwood, 4½c. per lb., in 250-lb. bbls.

Connellsville — Furnace, $17@$18; foundry, $18@$20.

The Outlook for Silver

Foreign Silver Remains But Little Below "Dollar Silver"—Dullness of Chinese Business and Reversion of India's Trade Balance to Pre-War Tendency Have Depressed Prices—Pittman Act Has Removed United States Silver From the World's Supply

ON JUNE 16 silver was quoted at the lowest price for the year, 80c. per oz., but since that date has gradually risen to the present (July 25) quotation of 95c., which is only 5c. below the price of "dollar silver" established by the Pittman Act. For the last few weeks foreign silver has reach a stable level close to the firm domestic price, with daily fluctuations that do not seem warranted by the amount of business done, although this circumstance itself is likely to make the market unusually sensitive in price changes. That the speculative influences at work in the silver market, caught in the recent big drop, have partly worked themselves out is indicated by the recent advance to the 95c. quotation, and might be explained by the absorption of the large accumulated stocks formerly in the hands of speculators who had played for a rise, but who have been consistently unloading their silver since the beginning of the decline. It is also not unlikely that the paucity of general supplies is being felt, helping to raise the price relatively close to dollar silver.

One Effect of the Pittman Act

The direct effect of the Government's purchases of silver produced in the United States is to withdraw from the world's available silver production fifty to sixty million ounces for the next four years, provided, of course, that silver generally does not rise above one dollar an ounce. The burden of meeting the entire world's requirements is therefore thrown upon other silver-producing nations, such as Mexico and Canada. Even the United States' consumption in the arts will likely be met by foreign silver, as no silver consumer will purchase dollar silver when lower priced foreign silver is available.

The Pittman Act has withdrawn about one-third of the world's total annual silver production and directed it into the United States mints. The result of this step would undoubtedly be more marked were it not for the unprecedented action of European nations in recently placing on the market large quantities of silver coin and bullion, thereby balancing the effect of the American withdrawals. One bullion broker has estimated that in the last three months fifteen million ounces of Continental silver were marketed, because silver is one of the few commodities in the possession of European nations with greatly depreciated currency that commanded a relatively high value and that could be readily and satisfactorily marketed for relatively enormous realizations in depreciated currency. According to Gresham's law the depreciated currency would have a tendency to displace the silver coinage. The European meltings were one of the great contributing agencies to the recent demoralization in the market.

The world's production of silver from available accounts has shown a decline during 1919. An estimate for that year follows:

	Production in Ounces
United States	55,300,000
Mexico	62,500,000
Australia	5,900,000
Canada	15,675,000
Others	37,000,000
	176,375,000

In 1918 production was estimated by the Bureau of the Mint at 197,394,900 oz.; in 1917 at 174,187,800 oz., and in 1916 at 168,843,000 oz.

The 1919 output, despite the high price of silver, exhibits a marked decrease in the world's production from 1918, and can be explained as being caused first by the unsatisfactory copper situation, with the consequent decrease in byproduct silver production, and second by a sharp decrease in Canadian production.

Considering the smallness of the silver market covering the arts in the United States and in the world in general the major interest in this country is probably on the side of the producer in maintaining high silver prices, although there are instances where a low silver price is desirable. This inclination toward the market is characteristic of practically the whole North American continent, as it produces most of the world's silver. On the other side of the fence is presumably the dominating consumption of India, controlled by the British government through the London market, whose interests do not lie in a high price for silver. China, another silver-consuming country, finds it advantageous to maintain silver at a high value, thus permitting enlarged imports and high prices for exports. This condition, however, is not favorable to European interests controlling Chinese markets, who do not like to see the volume of trade affected by high silver prices, as high silver implies a costly settlement for a favorable trade balance.

Conditions in the Far East

Exporters have keenly observed the effect of present silver prices upon the Far East. Business conditions in China are reported dull, with an improvement in the silver market necessary to encourage business. It has been estimated that the fall in silver has resulted in a loss of about $70,000,000 to Chinese merchants, in settlement for goods bought from them, and has put a strong brake to import trade, with export trade continuing dull.

The situation in India is none too bright, the balance of trade having turned against India. Normally India has an adverse trade balance of $90,000,000, and although there was a favorable balance that reached unusual proportions during the war reversion has now set in to the pre-war tendency. The financial difficulties of Japan have affected the exports of cotton from India, and the exports of raw produce have come to a low point. India is still refraining from making extensive silver purchases.

India's Enormous Silver Consumption

The following official figures as given by Samuel Montagu & Co. show the powerful absorption of gold and silver by India:

NET IMPORTS OF GOLD

	Average of Five Years 1909-10 to 1913-14. (Pre-War Average)	1917-18
On private account	£19,242,000	£13,292,000
On government account	476,000 (net exp.)	3,483,000
Total net imports	£18,766,000	£16,775,000

The following year the movement of gold was reversed and net exports were recorded as follows:

	Net exports 1918-19
On private account	£1,656,000
On government account	2,053,000
Total	£3,709,000

NET IMPORTS OF SILVER

	Average of Five Years, 1909-10 to 1913-14 (Pre-War Average)	1917-18	1918-19
On private account	£4,806,000	£ 457,000	£678,000
On government account	2,346,000	12,238,000	44,601,000
Total net imports	£7,152,000	£12,695,000	£45,279,000

It will be noted that in the last year almost seven times as much silver was imported as for the average pre-war rate, which is a gage of India's tremendous silver accumulation.

The Outlook for Silver

The future position of silver will be influenced by the same consideration that holds for most commodities, supply and demand, but the enigmatical behavior of silver makes

prophecy unusually risky. The world's supply will reflect the ability of Mexico to provide for any increased demand for silver, something which that country is well able to do, if the Mexican government firmly exercises its authority. Production in the United States for the next few years need not be considered as it is being taken care of under the Pittman Act.

The world demand is exceedingly difficult to judge. Continental European coinage demands will have to be satisfied at some future date to replenish the exhausted stocks, but this is not to be looked for until silver rules at a lower price. India's puzzling requirements are as much a matter of whim as of trade, and reasoning along the latter line may lead to an erroneous conclusion. The consumption of silver by India for the past fifteen years in per cent of the world's production is given by the director of statistics for India as follows:

	Per Cent
1904-5 to 1913-14	35
1909-10-11-12-13-14	26
1914-15	32
1915-16	17
1916-17	53
1917-18	40
1918-19	112

During the last year China imported gold estimated at $300,000,000, and as China is a silver-standard country there is a possibility that this gold may be converted into silver, but to facilitate this exchange the Chinese must be induced to believe that silver is relatively cheap, and the question arises as to when the Chinese will consider silver cheap. Chinese exports are now at a standstill, and the only absorption of appreciable amounts of silver would seem to be in exchange for this Chinese gold.

July, 1920, Mining Dividends

The following is a partial list of mining dividends paid during July, 1920:

U. S. Mining and Metallurgical Companies	Situation	Per Share	Totals
Am. Smelt. Sec., pfd. A	U. S.-Mex.	$1.50 q.	$146,071.00
Am. Smelt. Sec., pfd. B	U. S.-Mex.	1.25 q.	39,855.00
Caledonia Mining Co., l. s	Idaho	.01 m.	26,050.00
Camp Bird, Ltd., pfd., g. s	Col.	8 2/5 d. s-a	£38,502
Daly Mining Co., s. l	Utah	.10 q.	$15,000.00
Daly West Mining Co., s. l	Utah	.25 q.	62,500.00
Electric Point Mining Co., l	Wash.	.03 k.	23,812.50
Inspiration Consol. Copper	Ariz.	1.00 q.	1,181,967.00
Judge Mining & Smelting, s. l	Utah	.12½ q.	60,000.00
Phelps Dodge Corp	U. S.-Mex.	2.50 q.	1,125,000.00
Portland Gold Mining Co	Col.	.01½ q.	45,000.00
Tintic Standard Mining Co., l. s	Utah	.10 q.	117,470.00
Tonopah Extension Mining Co., g. s.	Nev.	.05 q.	64,140.00
United Eastern Mining Co., g	Ariz.	.15 q.	204,455.00
U. S. Smelt. Ref. & Min	U. S.-Mex.	1.50 q.	526,673.00
U. S. Smelt. Ref. & Min., pfd	U. S.-Mex.	.87½ q.	425,555.00
Vanadium Corp. of Amer	Col.-Peru	1.50 q.	560,001.00
Canadian, Mexican, Central and South American Companies	**Situation**	**Per Share**	**Totals**
Alvarado Mining & Milling, s. g	Mex.	$0.50 q.	$17,500.00
Asbestos Corp. Canada, Ltd	Quebec	1.50 q.	45,000.00
Asbestos Corp. Canada, Ltd., pfd	Quebec	1.75 q.	70,000.00
Consol. Mining & Smelt Co., Canada	B. C.	.62½ q.	263,342.00
Dome Mines Co., Ltd., g	Ont.	.25 q.	100,000.00
Frontino & Bolivia Gold Mining Co.	Colombia	5% k.	£7,000
Frontino & Bolivia Gold Mining, pfd.	Colombia	5 %k.	£10,000
Howe Sound Co., c	B. C.-Mex.	.05 q.	$99,208.00
McKinley-Darragh-Savage, Ltd., s	Ont.	.03 q.	67,431.00
N.Y. & Honduras Rosario M.Co., s.g.	Honduras	.50 q.-x.	100,000.00
Nipissing Mines Co., Ltd., s	Ont.	.25 q.	300,000.00
St. John del Rey Mining Co., Ltd., g.	Brazil	1 sh. 3 d.	£6,250
St. John del Rey Mining, Ltd., pfd	Brazil	1 sh.	£5,000
Santa Gertrudis Co., Ltd., g. s	Mex.	1 sh. k.	£75,000

m, monthly; q, quarterly; s.-a., semi-annual; k, occasional; x, includes extra dividend.

The comments made in this column on p. 1147 of our issue of May 15 still indicate present tendencies. Inspiration Consolidated Copper and United Eastern Mining both show decreases in their quarterly dividends. Caledonia Mining changes with this month from a monthly to a quarterly dividend. Daly West is the only company increasing its dividend, but Electric Point appears with its second disbursement and Vanadium Corporation makes its second quarterly payment. There are a number of changes in the list of companies outside the United States.

COMPANY REPORTS

St. John Del Rey Mining Co., Ltd.

Gold; Brazil

The eighty-ninth annual report of the directors of the St. John Del Rey Mining Co., Ltd., a British corporation operating the deepest mine in the world, states that 105,537.59 oz. of gold was produced during the year ending February, 1920, having a value of £447,028; silver was produced to the value of £7,549.

The average value of the ore milled per long ton was 54s. 9¼d. Working costs for the year were £365,382; development costs, £12,207; London expenses, £14,160; a total of £391,749.

Total realization from ores and bullion, less government duties, was £500,354, giving a favorable balance of £108,605, to which was added the amount brought forward from the last account, £19,255, and an excess profits duty refund of £32,269, bringing the balance to £160,129. From this amount was paid £14,268 in the form of a 10 per cent preference share dividend and tax; £54,626 in ordinary share dividends and tax; £23,781 in the form of an income tax; and £500 to war funds; or a total £93,193, leaving a balance of £66,936. Of this amount £50,000 was transferred to capital works account and the balance, £16,936, was carried forward.

The decreased output for the year was due to the delay, caused by the war, in the delivery of the plant necessary for cooling the mine; the heat at the lower horizons seriously affecting the efficiency of the labor.

Indications as to the value of mineral in depth continue favorable. The assay value for the year was 59s. 3d., as compared with an average of 54s. 8d. for the two preceding years.

Howe Sound Co.

Copper; Silver; Lead—British Columbia and Mexico

The annual report of the Howe Sound Co. for the year 1919 states that its holding of all the outstanding stock of the Brittania Mining & Smelting Co., Ltd., remains unchanged. During the year there was shipped to the Tacoma smelter 70,009 tons of concentrate containing 4,349.85 oz. gold, 99,863.0 oz. silver, and 17,330,844.0 lb. copper from the British Columbia operations.

In Mexico the high cost of silver facilitated operations. There were shipped during the year 159,060 dry tons of ore, classified as follows:

	Tons	Average Silver Oz.	Average Lead Per Cent	Average Zinc Per Cent.
Lead carbonates	108,784	13.75	5.15	.....
Lead sulphides	21,592	22.55	7.06	.....
Iron sulphides	26,329	32.35	0.85	.....
Zinc ore	2,355	....	....	27.78

Mining costs covering all operations were $1,915,034.04; milling, $479,550.63; smelting and marketing, $2,303,945.77; transportation, $237,667; taxes, $223,482.96; and other expenses totaled $85,329.38. Depreciation and depletion amounted to $1,583,605.25, and interest to $231,102.63. Deducting these expenses from the total smelter return of $6,936,069.42 plus a miscellaneous income of $143,011.75, a profit balance of $19,363.51 is obtained, which, when added to the balance of Dec. 31, 1918, of $3,597,847.88, and deducting thereform four dividends totaling $396,830.00, gives a balance on hand Dec. 31, 1919, of $441,738.72.

Seoul Mining Co. Passes Dividend

Of mining companies working in Japan the report of the Seoul Mining Co. for the year 1919 states that for the first time in the history of the company the expenditures for the year will exceed the receipts and that it would therefore not be possible to distribute any dividends from the 1919 earnings.

The Oriental Consolidated Mining Co., an American company operating the Unsan mine, was able to declare a dividend of only 2½ per cent for the year, whereas the dividend for 1918 was 5 per cent.

MINING STOCKS

Week Ended July 24, 1920

Stock	Exch.	High	Low	Last	Last Div.		
COPPER							
Adventure	Boston	*65	*65	*65			
Ahmeek	Boston	59½	59	59	June '20, Q	.50	
Alaska-B.C.	N. Y. Curb	1		1			
Allouez	Boston			28½	Mar. '19,	1.00	
Anaconda	N. Y.	56½	55½	55⅝	Feb. '20, Q	1.00	
Ariz. Com'l	Boston			10	Oct. '18,	.50	
Big Ledge	N. Y. Curb						
Bingham Mines	Boston	9½	8¾	8⅞	Sept. '19, Q	.25	
Calumet & Ariz.	Boston	58	57	58	June '20, Q	1.00	
Calumet & Hecla	Boston	305	300	301	June '20, Q	5.00	
Canada Copper	N. Y. Curb						
Centennial	Boston			11½	Dec. '18, SA	1.00	
Cerro de Pasco	N. Y.	43¾	43	43½	June '20, Q	1.00	
Chief Consol.	Boston Curb	3⅜	3⅛	3⅛	Feb. '20, Q	.10	
Chile Cop	N. Y.	15⅞	14⅝	15⅛			
Chino	N. Y.	29⅜	28⅝	29⅛	June '20, Q	.37½	
Columbus Rexall	Salt Lake	46½	41½	41			
Con. Ariz.	N. Y. Curb				Dec. '18, Q	.05	
Con. Copper M.	N. Y. Curb			2⅞			
Copper Range	Boston	39	37⅝	39	June '20, Q	.50	
Crystal Copper	Boston Curb	*30	*25	*28			
Davis-Daly	Boston	8⅞	8½	8⅞	Mar. '20, Q	.25	
East Butte	Boston	12½	12	12½	Dec. '19, A	.50	
First Nat'l	Boston Curb	*98	*90	*90	Feb. '19, SA	.15	
Franklin	Boston	*90	*65	*90			
Gadsden Copper	N. Y. Curb			*71			
Granby Consol.	N. Y.	35⅜	35⅛	35⅜	May '19, Q	1.25	
Greene-Can.	N. Y.	30	30	30	Feb. '19, Q	1.50	
Hancock	Boston	4½	4½	4½			
Houghton	Boston Curb			*60			
Howe Sound	N. Y. Curb			3¾	July '20, Q	.05	
Inspiration Con.	N. Y.	50	49½	50	July '20, Q	1.00	
Iron Cap	Boston Curb			9	Feb. '19, M	.25	
Isle Royale	Boston	30	29½	30	Sept. '19, SA	.50	
Kennecott	N. Y.	25⅞	25⅝	25⅝	June '20, Q	.50	
Keweenaw	Boston			1⅝			
Lake Copper	Boston	3⅛	3	3			
La Salle	Boston	3	3	3			
Magma Chief	N. Y. Curb			*21			
Magma Copper	N. Y. Curb			30	Jan. '19, Q	.50	
Majestic	Boston Curb	*17	*15	*15			
Mason Valley	N. Y. Curb			2½			
Mass. Con.	Boston			3	Nov. '17, Q	1.00	
Mayflower-O.C.	Boston	5⅜	4⅞	5			
Miami	N. Y.	20⅝	20⅛	20⅜	May '20, Q	.50	
Michigan	Boston	4½	4½	4½			
Mohawk	Boston	64	60	64	Feb. '20, Q	1.50	
Mother Lode (new)	N. Y. Curb	6	5¾	5¾			
Nevada Con.	N. Y.	12⅛	12	12⅛	June '20, Q	.25	
New Arcadian	Boston	2¼	2¼	2¼			
New Baltic	Boston Curb			3			
New Cornelia	Boston	17½	17	17⅛	May '20,	.25	
Nixon Nev.	N. Y. Curb			*9			
North Butte	Boston	16½	16	16⅛	Oct. '18, Q	.25	
North Lake	Boston			*60			
Ohio Copper	N. Y. Curb						
Ojibway	Boston			1⅜			
Old Dominion	Boston	25	25	25	Dec. '18, Q	1.00	
Osceola	Boston	38½	38⅛	38⅛	June '20, Q	.50	
Phelps Dodge	Open Mar.	†195	†180		July '20, Q	2.50	
Quincy	Boston	50	50	50	Mar. '20, Q	1.00	
Ray Con.	N. Y.	16⅛	15⅜	15⅝	June '20, Q	.25	
Ray Hercules	Boston Curb	*60	*60	*60			
St. Mary's M. L.	Boston	42	42	42	June '20, K	2.00	
Seneca	Boston	14½	13½	13⅞			
Shannon	Boston	1¼	1⅛	1⅛	Nov. '17, Q	.25	
Shattuck Ariz.	N. Y.	10	9⅛	9⅛	Jan. '20,	.25	
South Lake	Boston	2⅜	2⅜	2⅜			
South Utah	Boston	*24	*15	*15			
Superior	Boston			5	Apr. '17,	1.00	
Superior & Boston	Boston	3½	3	3½			
Tenn. C. & C.	N. Y.	9⅞	9½	9⅝	May '18, I	1.00	
Tuolumne	Boston	*65	*58	*58	May '13,	.10	
United Verde Ex.	Boston Curb	31⅞	31⅛	31⅛	June '20, Q	1.50	
Utah Con.	Boston	6½	6½	6⅝	Sept. '18,	.25	
Utah Copper	N. Y.	68	66	67	June '20, Q	1.50	
Utah M. & T.	Boston	1⅝	1¼	1¼	Dec. '17,	.30	
Victoria	Boston			2⅜			
Winona	Boston			*50			
Wolverine	Boston	15	14½	15	Jan. '20, Q	.50	
LEAD							
Hecla	N. Y. Curb	4½	4	4	June '20, QX	.20	
St. Joseph Lead	N. Y.	15⅞	15⅜	15⅜	June '20, QX	.50	
Stewart	Boston Curb			*16	Dec. '15,	.05	
Utah Apex	Boston	1⅛	1⅛	1⅛	Nov. '18,	.25	
ZINC							
Am. Z. L. & S.	N. Y.	14	12⅞	13	May '17,	1.00	
Am. Z. L. & S. pf.	N. Y.	47⅜	47⅛	47⅛	May '20, Q	1.50	
Butte C. & Z.	N. Y.	8⅜	8	8⅛	July, '18, I	.50	
Butte & Superior	N. Y.	22½	22⅛	22⅜	Sept. '17,	1.25	
Con. Interst. Cal.	N. Y.	12⅜	11	12	June '20, Q	.50	
New Jersey Z.	N. Y. Curb	196	192	192	May '20, SA	4.00	
Success	N. Y. Curb	*4	*4	*4	July '16,	.03	
Yellow Pine	Los Angeles	1.02	1.00	1.01	June '20, Q	.03	

Stock	Exch.	High	Low	Last	Last Div.	
GOLD						
Alaska Gold	N. Y.	1⅜	1¼	1⅜		
Alaska Juneau	N. Y.	2	1⅞	1⅞		
Carson Hill	N. Y. Curb	26¼	24	26¼		
Cresson Consol. G.	N. Y. Curb			1⅞	June '20, Q	.10
Dome Ex.	Toronto	*29½	25	*25		
Dome Mines	N. Y.	10⅝	9¾	10⅝	July '20, Q	.25
Golden Cycle	Colo. Sprgs.	†*75	†*68		May '20, Q	.02
Goldfield Con.	N. Y. Curb	*11	*9	*9½	Dec. '19,	.05
Hedley	Boston			4¼	June '19,	.10
Hollinger Con.	Toronto	5.70	5.55	5.55	June '20, BM	.05
Homestake	N. Y.			55	Sept. '19,	.50
Kirkland Lake	Toronto	*49	*48½	*48¾		
Lake Shore	Toronto	†1.20	†1.15		Oct. '19,	.02½
McIntyre-Porcupine	Toronto	1.90	1.82	1.90	May '20, K	.05
Porcupine Crown	Toronto	*27	*27	*27	July '17,	.03
Portland	Colo. Sprgs.	†*62	†*59		July '20, Q	.01½
Reorgan. Booth	N. Y. Curb	*5⅛	*5	*5	May '19,	.05
Silver Pick	N. Y. Curb	*6	*5	*5⅛		
Teck Hughes	Toronto	†*11	†*8½			
Tom Reed	Los Angeles	1.03	*98½	1.02	Dec. '19,	.02
United Eastern	N. Y. Curb	2¾	2⅝	2 11/16	Apr. '20, Q	.21
Vindicator Consol.	Colo. Sprgs.	†*24	†*20		Jan. '20, Q	.01
West Dome	Toronto	*6¾	*6¾	*6¾		
White Caps Min.	N. Y. Curb	*11	*9	*10		
Yukon Gold	Boston Curb			1	June '18,	.02½
SILVER						
Arizona Silver	Boston Curb	*18	*13	*14	Apr. '20, M	.03
Beaver Con.	Toronto	*43	*43	*43	May '20, K	.03
Coniagas	Toronto	†3.50	†2.50		May '20, Q	.25
Crown Reserve	Toronto	*25	*23½	*25	Jan. '17,	.05
Kerr Lake	Boston	3½	3¾	3⅜	Sept. '19,	1.00
La Rose	Toronto	*40	*38		Apr. '18,	.02
McKinley-Dar.	N. Y. Curb			*50	July '20, Q	.03
Mining Corp.	Toronto	1.95	1.95	1.95	June '20, Q	.12½
Nipissing	N. Y. Curb	8⅜	8⅛	8⅜	July '20, Q	.25
Ontario Silver	N. Y.	6	6	6	Jan. '19, Q	.50
Ophir Silver	N. Y. Curb				Jan. '12,	.10
Peterson Lake	Toronto	*13½	*13	*13	Jan. '17,	.01¼
Sil. King Ariz.	N. Y. Curb	*34	*30	*34		
Temiskaming	Toronto	*35	*35	*35	Jan. '20, K	.04
Trethewey	Toronto	*30½	*29½	*29½	Jan. '19,	.05
GOLD AND SILVER						
Atlanta	N. Y. Curb	*2	*1	*1⅜		
Barnes-King	Butte			1.11	May '20, Q	.05
Bost. & Mont.	Boston			*63		
Cashboy	N. Y. Curb	*7½	*6	*7½		
El Salvador	N. Y. Curb	2	1¾	1¾		
Jim Butler	N. Y. Curb	*14	*13	*14	Aug. '18, SA	.07
Jumbo Extension	N. Y. Curb	*5	*4	*4	June '16,	.05
Louisiana Con.	N. Y. Curb					
MacNamara M.	N. Y. Curb				May '10,	.02½
N.Y. Hond. Rosar.	Open Mar.	†13	†11½		July '20, QX	.50
Tonopah-Belmont	N. Y. Curb	1¾	1⅝	1⅝	Jan. '20, Q	.05
Tonopah-Divide	N. Y. Curb	1⅜	1¼	1⅜		
Tonopah Ex.	N. Y. Curb	1⅝	1	1⅝	July '20, Q	.05
Tonopah Mining	N. Y. Curb	1⅞	1⅜	1⅝	Oct. '19, SA	.15
West End Con.	N. Y. Curb	1⅛	1¼	1 1/16	Dec. '19 SA	.05
SILVER-LEAD						
Caledonia	N. Y. Curb	*23	*21	*22	July, '20, M	.01
Consol. M. & S.	Montreal	26	25	26	July '20, Q	.62½
Daly Mining	Salt Lake			2.60	July '20, Q	.10
Daly-West	Boston	4	4	4	July '20, Q	.25
Eagle & Blue Bell	Boston Curb			2 1/16	Apr. '20, Q	.10
Electric Point	Spokane			30	May '20, SA	.03
Fed. M. & S.	N. Y.	12⅞	12⅝	12⅝	Jan. '09,	1.50
Fed. M. & S. pf.	N. Y.	36¾	36¼	36¼	June, '20, Q	1.75
Florence Silver	Spokane			*45	Apr. '19,	.01½
Iron Blossom	N. Y. Curb				Apr. '20, Q	.02½
Judge M. & S.	Salt Lake			3.90	July '20, Q	.12½
Marsh Mines	N. Y. Curb	*12	*10	*12		
Prince Consol.	N. Y. Curb				Nov. '17,	.02½
Rambler-Cariboo	Spokane			*10	Feb. '19,	.01
Rex Con.	N. Y. Curb	*7	*6	*7		
South Hecla	Salt Lake			*96	Sept. '19, K	0.15
Stand. S. L.	N. Y. Curb				Oct. '17,	.05
Tamarack-Custer	Spokane			2.42	Dec. '19, K	.03
Tintic Standard	Salt Lake	3.37½	3.22½	3.35	June '20, Q	0.10
Wilbert	N. Y. Curb	*4½	*4	*4	Nov. '17,	.01
NICKEL-COPPER						
Internat'l Nickel	N. Y.	18⅞	17½	18⅞	Mar. '19,	.50
Internat'l Nick.pf.	N. Y.			81	May '20, Q	1.50
QUICKSILVER						
New Idria	Boston			5	Jan. '19,	.25
TUNGSTEN						
Mojave Tungsten	Boston Curb			*10		
VANADIUM						
Vanadium Corp.	N. Y.	87½	83	83½	July '20, Q	1.50
ASBESTOS						
Asbestos Corp.	Montreal	87¼	85¾	86½	July '20, Q	1.50
Asbestos Corp. pf.	Montreal	95	94	95	July '20, Q	1.75
MINING, SMELTING AND REFINING						
Am. S. & R.	N. Y.	60¼	58¾	58¾	June '20, Q	1.00
Am. S. & R.pf.	N. Y.	90¼	89¼	90¼	June '20, Q	1.75
Am. Sm. pf.A	N. Y.	75	74	75	July '20, Q	1.50
U. S. Sm. R. & M.	N. Y.	58	57	57	July '20, Q	1.50
U.S.S.R.& M. pf.	Boston	45	43¾	44¾	July '20, Q	.87½

*Cents per share. †Bid or asked. ‡Quotations missing. Q, Quarterly.
SA, Semi-annually. BM, bimonthly. K, Irregular. I, Initial. X, includes extra

INDUSTRIAL NEWS

Barglebaugh & Whitson, consulting engineers of El Paso, Texas, and elsewhere, announce the association with them of Arthur F. Barnes, formerly with New Mexico State College. Mr. Barnes will manage their New Mexico-Arizona district.

Westinghouse Electric & Manufacturing Co. stockholders, at the recent annual meeting, unanimously re-elected the following directors, to serve three years: Guy E. Tripp, chairman of the board; Joseph Marsh, of Pittsburgh, Pa.; H. H. Westinghouse, of the air brake company; A. H. Wiggin, of Chase National Bank; and George W. Davison, of the Central Union Trust.

Stephens-Adamson Manufacturing Co., Aurora, Ill., has opened a branch store, assembling shop and sales office at 412-414 E. Third St., Los Angeles, Cal. A large stock of S-A belt conveyors and other standard S-A transmission and screening machinery is carried there. R. C. Pierce, the Los Angeles district manager, is in charge.

Electric Furnace Co., Alliance, Ohio, has opened a Middle Western office at 301 Frisco Building, St. Louis, Mo., to accommodate the increasing demand for Baily electric furnaces in that region. W. E. Prosser is in charge of the St. Louis branch.

Wright Manufacturing Co., Lisbon, Ohio, maker of hoists and hoist-trolleys, is reaching out for oriental trade in a logical manner. In Japan the company distributes catalogues printed for it in Japanese by the General Commercial Co., Ltd., of Yakohama, Japan. Its catalogues appeal not only through the fact that they are in the vernacular, but also because they explain the principles embodied in the manufacture of the hoists.

Howard N. Eavenson has resigned as chief engineer of U. S. Coal & Coke Co., at Gary, W. Va., and Lynch, Ky., to open a private office as mining engineer at 230 Fifth Ave., Pittsburgh, Pa. (Telephone Court 559.)

Bessemer Gas Engine Co., of Grove City, Pa., announces the opening of a new sales office and service station at 615 Market St., Shreveport, La. A. K. De France will be in charge.

Ray T. Middleton, former general sales manager of the Standard Steel Castings Co., Cleveland, Ohio, has been elected vice-president and director of sales and advertising for Kelly Metals Co., Chicago, Ill., Detroit, Mich., and Los Angeles, Cal. Mr. Middleton's headquarters will be Chicago, where the Kelly Metals Co. is establishing its principal production plant.

Arthur D. Little, Inc., chemists and engineers, Cambridge, Mass., announce the recent addition of Earl Stafford to their engineering staff. Mr. Stafford is a graduate of Tufts College, 1908.

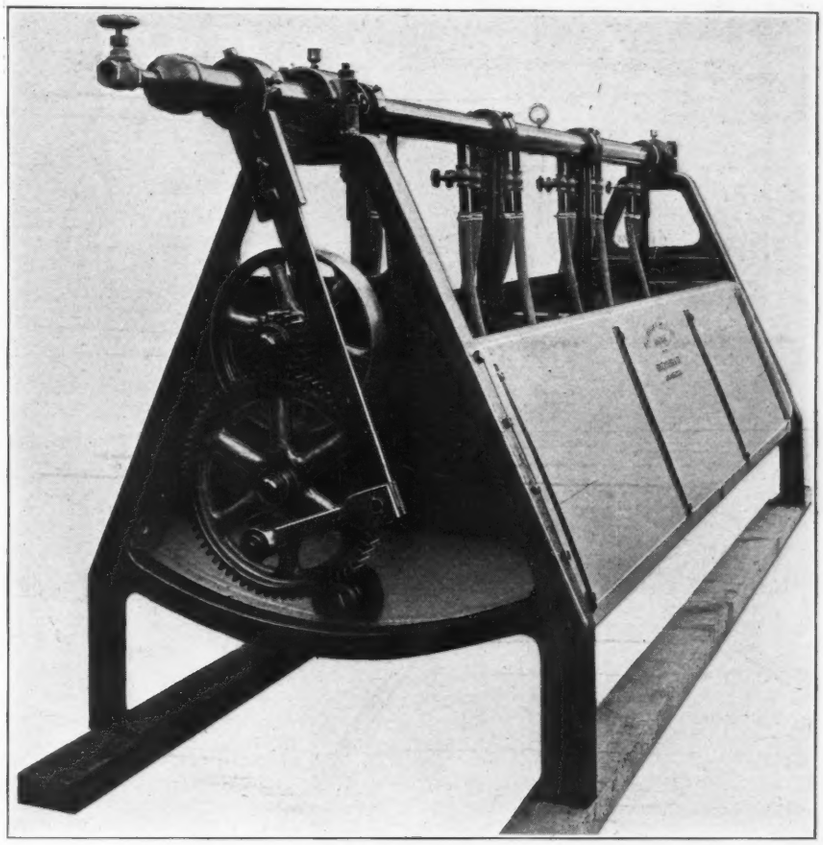
Oscillating Flotation Machine Cleans Mats

Sloping Sides Give Excellent Froth—Stirring Swing Yields Desired Uniform Pulp Depth

By E. I. MILLS

An oscillating cell type of flotation machine for the separation of minerals, has recently been made by John Allingham, of Los Angeles, Cal.

In this design all parts of the machine are subject to the control of the operator while the machine is in operation. Parts to be replaced are simple and may be found at any milling store house, and the horsepower required is much less per ton of ore treated than in any of the other standard machines, not exceeding ½ hp. for either the 6 ft. or 9 ft. size.



ALLINGHAM'S NEW FLOTATION MACHINE

The tank or container bottom is curved on an arc of the proper radius to accommodate the oscillation of the mat carriers from side to side. The sides of this tank converge slightly at the top, thus reducing the froth area, which results in a heavier and stronger froth of the proper mineral-carrying consistency.

The mats are hung from a manifold which is suspended from the ends of the tank, permitting a free movement sufficient for the oscillation of the mat carriers attached thereto. This oscillation is accomplished by a connection of the manifold to a spur gear by means of a connecting rod, this gear in turn connecting with a spur pinion attached to a pulley, thus reducing the speed sufficiently to allow the driving of the machine from a comparatively fast running line shaft. The number of oscillations per minute can be regulated absolutely to suit the amount and weight of minerals contained in the ore. The usual range is from 25 to 45 oscillations per minute. The air from a blower of the positive type is supplied through the manifold by hose pipes each arranged with a valve for close regulation. The quantity of air required is about 1 cu.ft. per minute per ton treated in twenty-four hours.

The oscillation cell produces a uniform, consistent froth. The passing of the cell from side to side through the pulp keeps the mats constantly clean and prevents banking of the sands, and at the same time keeps the channel of the rising bubbles broken and the ore in gentle suspension, thus making an ideal condition for the attachment of oil to the mineral and the raising of the mineral by the bubbles. These conditions are caused by the important feature of direction of travel of the mats. This travel of oscillation is at right angles to the flow of pulp.

It has long been the desire of flotation machine builders to get a machine having an equal depth of pulp throughout, as it is generally known that an equal hydrostatic pressure above the cells is conducive to the best results. This, I believe, is the first machine of this kind that embodies this feature.

New and Simple Tunneling Machine

What seems to be an efficient tunneling machine of simple construction and economical operation is shown in the cut below, which illustrates a device perfected and built by W. E. Dean, of the Dean Tunneling Machine Co., 1311 Ogden Ave., Superior, Wis.

As a close inspection would show, the machine consists of a gang of eight heads mounted in line on an oscillating cross-frame supported by a curved rack and the quadrangular I-beam frames filling the tunnel as cut.

The eight heads are nine inches in diameter, have a ten-inch stroke and

DEAN TUNNELING MACHINE AT WORK

each throws its 700-lb. weight 150 times per minute. The piston pressure for each stroke is 3,000 lb. and drives, in all, 420 tons of steel against the rock each minute. The motive power is compressed air used expansively on both strokes. The whole machine, operating and shifting, is controlled by one man riding on the iron seat which is attached to the drill cross-frame. With the aid of a second man mucking into the conveyor loader, the machine has been known to make a headway of one foot per hour. Those interested should write to the above address for further details.

Complete Mill Unit on Exhibition

Negotiations have just been closed for the purchase of one of the units of the Hackberry Mines, in Arizona, by Rosenburg & Co., of Los Angeles, Cal. The complete unit purchased by the Los Angeles distributors has never been used, but was installed merely as a reserve plant. It is the intention of Rosenburg & Co. to transport the equipment of this unit to its Los Angeles warerooms for inspection by the mining trade.

The Los Angeles company also announces the opening of a new warehouse in Phoenix, Ariz. A lease has been taken for a large warehouse, 420 East Jefferson St., Phoenix, and it is the intention of the company to install a large stock of machinery at that place immediately. This is the third warehouse opened by Rosenburg & Co. Eighteen months ago a warehouse was established at Congress Junction, Ariz., being a branch of the Los Angeles warehouse. The new warehouse at Phoenix, which will open between June 20 and July 1, will carry a $500,000 stock of mining and milling machinery and equipment, and, in addition, will house a large quantity of electrical goods. The Allingham flotation machine, manufactured by Rosenburg & Co., will also be represented at the new Phoenix warehouse.

Pump Makers To Enter Marine Engine Field

The Worthington Pump & Machinery Corporation announces that it has completed preparations for the production of motor ship machinery and is now prepared to execute orders for complete engine-room equipment. Its entrance into this field is a natural result of the development of an old-established business of building auxiliary machinery of all kinds for steam plants, both stationary and marine, and of the company's parallel experience in the field of large internal-combustion engines. Already one type has been built at the Snow Works of this company—a 2,400-hp. six-cylinder, marine-Diesel engine, 26-in. bore, 46-in. stroke, 120 r.p.m.—and this type will be followed by such other sizes as may be required.

TRADE CATALOGS

Hoisting and Mining Machinery—The Wellman-Seaver-Morgan Co., Cleveland, Ohio, in Bulletin No. 44, shows reproductions of photographs, together with sectional drawings, of electric and steam hoisting equipment, cages and skips, revolving car tipples, mine car loaders, and Akron Chilean mills. The sectional drawings are novel, inasmuch as they give the effect of blueprints.

Mechanical Loading—The Lake Superior Loader Co., Duluth, Minn., has issued a recent bulletin which describes the construction and operation of the "Shuveloder." The increasing interest shown in mechanical loaders that are suitable for underground work is evidenced by the fact that an extensive field for this and similar types of loaders has developed during the past few years. Comparative performances of hand shoveling and the work done by the "Shuveloder" are tabulated in the bulletin and illustrate the excellent results that have been obtained by means of this machine.

Thermit Welding—The Metal & Thermit Corporation, 120 Broadway, New York, N. Y., has issued a third and revised edition of its pamphlet "Laboratory Experiments With the Thermit Process of Welding." This pamphlet is useful as a guide for acquainting students with the substance, characteristics, and results of the Thermit reaction. The pamphlet illustrates and describes experiments intended to show the speed of the reaction, the heat produced thereby, and the effects obtained by the superheated liquid slag and the superheated liquid steel.

A Combustion Recorder That Registers Both CO_2 and CO

The Mono Corporation of America, 48 Coal & Iron Exchange, Buffalo, N. Y., announces a recorder that enables the fireman constantly to see that no CO is present and that CO_2 is always maintained at a maximum.

Bonus systems based on percentages of CO_2 only have failed because the boiler-room force soon learns how to so manipulate the dampers that a high CO_2 reading is obtained. Yet combustion is incomplete and the object of the bonus system is defeated.

Now that both CO_2 and CO can be recorded, the fuel must be so burned that the percentage of CO_2 is as high as possible and at the same time there must be no CO. The device embraces two recorders, the Mono Monoxide recorder with records CO_2 and CO on the same chart, and "Monoxide Auxiliary Type K," which records CO on a second chart. Together the two records show combustion conditions. As the Mono Monoxide Recorder will also register SO_2, this device is valuable in pulp and paper mills.